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10ME71

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
Engineering Economy

Time: 3 hrs.

Max. Marks:100

- Note: 1. Answer FIVE full questions, selecting at least TWO questions from each part.**
2. Missing data to be assumed suitably.
3. Use of interest factor table is permitted.

PART - A

- 1 a. Discuss the interest rate from borrower's and lenders point of view with cash flow diagram. (05 Marks)
 b. Explain law of demand and supply with suitable example. (05 Marks)
 c. Determine the effective interest rate for a nominal annual rate of 6 percent that is compounded : (i) Semiannually (ii) Quarterly (iii) Monthly (iv) Daily (06 Marks)
 d. Deduce the expression for sinking fund factor (uniform series). (04 Marks)
- 2 a. What do you understand by present worth by the "72 Rule"? (02 Marks)
 b. Machine A has the first cost of ₹ 9000, no salvage value at the end of its 6-years useful life and annual operating cost of ₹ 5000. Machine B costs ₹ 16000 new and has an expected resale value of ₹ 4000 at the end of its 9 year economic life. Operating cost for machine B are ₹ 4000 per year. Compare the two alternatives on the basis of their present worths, using the repeated projects assumption at 10 percent annual interest. (08 Marks)
 c. A wealthy industrial economist dies and her will specifies that ₹ 5 million of her estate will go to xyz university to fund a small engineering economy building as well as 20 graduate scholarships per year over the next 20 years. The scholarships are to have a value of ₹ 12000 per year for the first year and should increase at a rate ₹ 1500 per year over the following 19 years. xyz university requires that ₹ 15000, starting with the third year of the bequest, be reserved for building maintenance and operating costs. These costs are to have a linear increase of ₹ 2000 per year, starting with year 4. Assuming that a 10 percent interest rate is used for such analysis, determine how much will be available for building first costs. (10 Marks)
- 3 a. What is annuity contract for a guaranteed income? Explain. (04 Marks)
 b. What is the uniform series value "A" of the following cash flow with non equal interest rates shown below: (08 Marks)

End of year	0	1	2	3	4	5
Interest rate %		7	7	9	10	5
Receipts in Rs.	10,000		10,000		10,000	
Payments in Rs.		3,000		6,000		11,000

- c. Two types of power converters, alpha and beta are under consideration for a specific application. An economic comparison is to be made at an interest rate of 10 percent and the following cost estimates have been obtained:

	Alpha	Beta
Purchase price	₹ 10,000	₹ 25,000
Estimated service life	5 years	9 years
Salvage value	0	₹ 5000
Annual operating cost	₹ 2500	₹ 1200

Determine the annual equivalent costs of the alternative systems.

(08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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- 4 a. Explain MARR, IRR. (03 Marks)
 b. A ₹ 1000 utility bond with 14 years remaining before maturity can be now purchased for ₹ 760. It pays interest of ₹ 20 each 6 month period. What rate of return is earned by purchasing the bond at the current market plus a brokerage charge of ₹ 20? (08 Marks)
 c. Explain the causes of depreciation with example. (09 Marks)

PART - B

- 5 a. Explain : (i) Prime cost (ii) First cost (iii) Sunk cost (iv) Life cycle cost (06 Marks)
 b. A small firm is producing 1000 pens per day. The cost of direct material is ₹ 1600 and that of direct labour is ₹ 2000. Factory overheads chargeable to it are ₹ 2500. If the selling on cost is 40% of the factory cost, what must be the selling price of each pen to realize a profit of 20 percent of the selling price? (07 Marks)
 c. The market price of a drilling machine is ₹ 50000 and the discount allowed to the distributors is 20 percent of the market price. The selling expenses cost is $\frac{1}{4}$ th of the factory cost. If the material cost, labour cost and factory overheads charges are in the of 1 : 4 : 2, what profit is made by the factory on each drilling machine, if the material cost is ₹ 4000? Other overheads may be neglected. (07 Marks)
- 6 a. Explain the relation between balance sheet and profit and loss account. (04 Marks)
 b. The company xyz having certain reserves and surplus has the following details on 31st March, 2013.

Dividend payable – ₹ 72000	Debtors – ₹ 1,60,000
Bank balance – ₹ 10000	Bills payable – ₹ 20,000
Equity share – ₹ 200000	Plant and equipment - ₹ 80000
Provision for tax – ₹ 40000	Bills receivable – ₹ 20000
Stock – ₹ 77,000	Creditors – ₹ 55,000
8% preferred share – ₹ 1,35,000	General reserve – ₹ 40000
Land and building – ₹ 2,00,000	Cash in hand – ₹ 15000

- Prepare balance sheet as on 31st March, 2013. (10 Marks)
 c. Explain the system of book keeping, journal and ledger. (06 Marks)
- 7 a. Explain in detail types of financial ratio analysis. (10 Marks)
 b. The company has an inventory of ₹ 180000 debtors of ₹ 115000 and an inventory turnover of 6. The gross profit margin of the company is 10 percent and its credit sales are 20 percent of the total sales. Calculate the average collection period. (Assume a 360 day year). (05 Marks)
 c. A company has a net profit after taxes ₹ 120000 and pays a cash dividend of ₹ 48000 on it 36000 shares outstanding at a time when the share is selling for ₹ 12. What is the yield and the dividend payout? (05 Marks)
- 8 a. Briefly explain the objectives of profit planning. (05 Marks)
 b. Explain essential of successful of budgeting. (05 Marks)
 c. Prepare a purchase budget in quantity and rupees from the following particulars when the estimated price / kg is A – ₹ 3, B – ₹ 4, C – ₹ 5, D – ₹ 6. (10 Marks)

Material	Estimated consumption of material in kgs
A	150000
B	175000
C	75000
D	300000

Material	Stock at the beginning	Stock at the end estimated
A	40000	20000
B	50000	25000
C	20000	5000
D	60000	50000

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10ME72

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
Mechanical Vibrations

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer FIVE full questions, selecting at least TWO questions from each part.
2. Missing data may be suitably assumed.

PART - A

- 1 a. Add the following harmonic motions analytically and check the solution graphically:
 $x_1 = 4 \cos(\omega t + 10^\circ)$, $x_2 = 6 \sin(\omega t + 60^\circ)$. (10 Marks)
- b. Represent the periodic motion given in the Fig.Q.1(b) by harmonic series. (10 Marks)

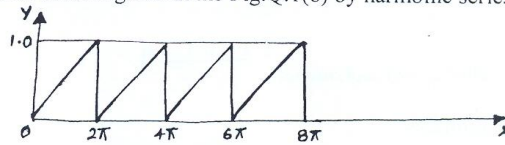


Fig.Q.1(b)

- 2 a. Determine the natural frequency of spring-mass system taking the mass of the spring into account. (10 Marks)
- b. Using energy method find the natural frequency of the system shown in the Fig.Q.2(b). (10 Marks)

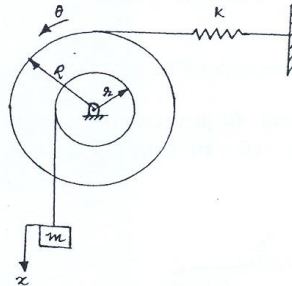


Fig.Q.2(b)

- 3 a. Obtain the response of viscous damped system for critically damped case. (10 Marks)
- b. The disc of a torsional pendulum has a moment of inertia of 0.06 kg m^2 and is immersed in a viscous fluid. The brass shaft attached to it is of 100mm diameter and 400mm long when the pendulum is vibrating. The observed amplitude on the same side of neutral position for the successive cycles are 9° , 6° and 4° . Determine:
- Logarithmic decrement.
 - Damping torque at unit velocity.
 - Periodic time of vibration.
 - The frequency if the pendulum is removed from the viscous fluid.
- Assume for brass shaft $G = 4.4 \times 10^{10} \text{ N/m}^2$. (10 Marks)

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- 4 a. Show that for a spring mass damped system the peak amplitude occurs at a frequency ratio given by the expression $\frac{\omega}{\omega_n} = \sqrt{1 - 2\xi^2}$, when the system is excited by a harmonic force. Also determine the expressions for peak amplitude and the corresponding phase angle. (10 Marks)
- b. A machine of mass one tonne is acted upon by an external force of 2450N at a frequency of 1500 rpm. To reduce the effects of vibration isolator of rubber having a static deflection of 2mm under the machine load and an estimated damping factor of 0.2 are used. Determine:
- Force transmitted to the foundation.
 - Amplitude of vibration of the machine.
 - Phase lag of the transmitted force with respect to the external force. (10 Marks)

PART – B

- 5 a. Explain Frahm's reed tachometer. (05 Marks)
- b. Explain Vibrometer. (05 Marks)
- c. A horizontal shaft of 25mm diameter carries a mass of 12kg mounted midway. The shaft is supported at the ends by two bearings. The span between the bearings is 900mm. The mass centre is 0.02mm from the axis of the shaft. Determine the amplitude of steady state vibrations and the dynamic force on the bearings when the shaft rotates at 3000 rpm. Take $E = 200\text{GPa}$. Neglect damping and mass of shaft. (10 Marks)
- 6 a. What is a "Semi definite system"? Explain. (08 Marks)
- b. Determine the natural frequencies of the system as shown in the Fig.Q.6(b) if $k_1 = 4 \times 10^3 \text{ N/m}$, $k_2 = 50 \times 10^3 \text{ N/m}$, $k_3 = 60 \times 10^3 \text{ N/m}$, $m_1 = 10\text{kg}$, $m_2 = 12\text{kg}$, $r_1 = 0.10\text{m}$ and $r_2 = 0.11\text{m}$. (12 Marks)

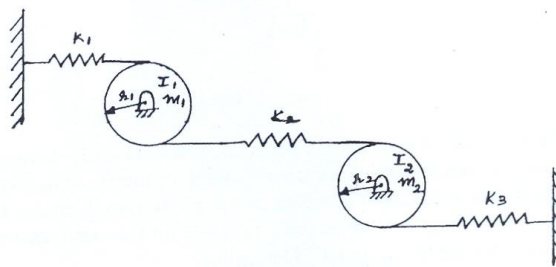


Fig.Q.6(b)

- 7 a. Using Stodala's method find the natural frequencies of the four mass system as shown in Fig.Q.7(a) if $k = 1 \text{ N/m}$ and $m = 1 \text{ kg}$. (15 Marks)

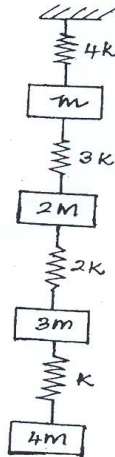


Fig.Q.7(a)

- b. Use Dunkerley method to find the fundamental natural frequency of transverse vibration for the system shown in Fig.Q.7(b). (05 Marks)

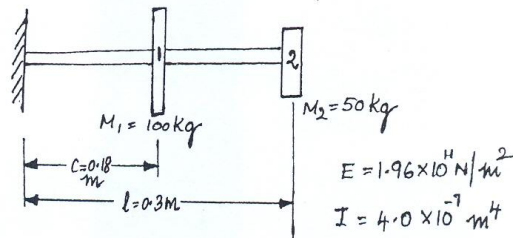


Fig.Q.7(b)

- 8 a. Briefly explain the hardware of an equipment necessary for experimental modal analysis. (10 Marks)
- b. Explain machine condition monitoring techniques. (10 Marks)

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10ME73

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
Hydraulics and Pneumatics

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1 a. State Pascal's law. Explain its applications, with a neat sketch. (04 Marks)
 b. Explain the working of unbalanced vane pump. Also obtain an expression for its theoretical discharge. (10 Marks)
 c. A pump having a displacement of 25cm^3 , operates with a pressure of 250 bar and speed of 1390 rpm. Volumetric efficiency of 0.85 and mechanical efficiency of 0.80. Calculate
 i) Pump delivery in LPM ii) Input power at pump shaft iii) Drive Torque at pump shaft. (06 Marks)
- 2 a. With neat sketches, explain First, Second and Third class lever system. (06 Marks)
 b. An 8 cm diameter hydraulic cylinder has 4cm diameter rod. If the cylinder receives the flow at 100 LPM and 12MPa. Find i) Extension and Retraction speeds ii) Extension and Retraction load carrying capacities. (04 Marks)
 c. Explain with a neat sketch : i) Balanced vane motor ii) Swash plate piston motor. (10 Marks)
- 3 a. Explain the working principle of pilot operated check valve with a neat sketch. Illustrate the graphical symbol of the valve (10 Marks)
 b. Explain with the aid of sketches :
 i) Non - compensated flow control valve ii) Compensated flow control valve. (10 Marks)
- 4 a. Explain the following : i) Meter In and Meter Out circuit ii) Classification of accumulator and explain any 2 types. (10 Marks)
 b. With a neat sketch, explain Hydraulic circuit for sequencing of Two cylinders. (10 Marks)

PART - B

- 5 a. How are hydraulic seals classified? Explain positive and non positive seals. (06 Marks)
 b. With the aid of sketches, explain the following : i) Return line filtering ii) Suction line filtering iii) Pressure line filtering. (06 Marks)
 c. Sketch and explain the "Reservoir System". (08 Marks)
- 6 a. Differentiate between Hydraulic and Pneumatic systems. (05 Marks)
 b. Sketch and explain the cushion assembly for a pneumatic cylinder. (07 Marks)
 c. Write short notes on : i) Cylinder mounting arrangement ii) Rod less cylinder. (08 Marks)
- 7 a. Explain with a suitable circuit diagram :
 i) Shuttle valve ii) Quick exhaust valve. (10 Marks)
 b. Briefly explain the following : i) OR gate ii) AND gate. (10 Marks)
- 8 Write short notes on :
 a. Solenoids.
 b. Air Driers.
 c. Air filters. (20 Marks)
 d. Motion Diagrams.

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10ME74

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
Operations Research

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1 a. Briefly explain the scopes of Operation Research. (05 Marks)
- b. A farmer has 100 acre farm. He can sell all tomatoes, lettuce or radishes and can rise the price to obtain Rs 1.00 per kg for tomatoes, Rs 0.75 a head for lettuce and Rs 2.00 per kg for radishes. The average yield per acre is 2000 kgs of tomatoes, 3000 heads of lettuce and 1000 kgs of radishes. Fertilizers are available at Rs 0.50 per kg and the amount required per acre is 100 kgs each for tomatoes and lettuce and 50 kgs for radishes. Labour required for sowing, cultivating and harvesting per acre is 5 man days for tomatoes and radishes and 6 man days for lettuce. A total of 400 man days of labour are available at Rs 20 per man day. Formulate this problem as a linear programming model to maximize the farmer's total profit. (15 Marks)

- 2 a. Write the dual of the following LPP.

$$\text{Minimize } Z = 3x_1 - 6x_2 + 4x_3$$

$$\text{Subject to } 4x_1 + 3x_2 + 6x_3 \geq 9$$

$$1x_1 + 2x_2 + 3x_3 \geq 6$$

$$6x_1 - 2x_2 - 2x_3 \leq 10$$

$$x_1 - 2x_2 + 6x_3 \geq 4$$

$$2x_1 + 5x_2 - 3x_3 \geq 6$$

$$x_1, x_2, x_3 \geq 0.$$

(05 Marks)

- b. Solve the following Linear Programming problem.

$$\text{Maximize } Z = x_1 + 2x_2 + 3x_3 - x_4$$

$$\text{Subject to } x_1 + 2x_2 + 3x_3 = 15$$

$$2x_1 + x_2 + 5x_3 = 20$$

$$x_1 + 2x_2 + x_3 + x_4 = 10$$

$$x_1, x_2, x_3, x_4 \geq 0.$$

Solve by using Two phase method.

(15 Marks)

- 3 a. ABC Limited has three production shops supplying a product to 5 warehouses. The cost of production varies from shop to shop, cost of transportation from shop to shop cost of transportation from shop to warehouses also varies. Each shop has a specific production capacity of each warehouse has certain amount of requirement. The cost of transportation are as given below :

Shop	Warehouse					Capacity	Cost of production
	I	II	III	IV	V		
A	6	4	4	7	5	100	14
B	5	6	7	4	8	125	16
C	3	4	6	3	4	175	15
Requirement	60	80	85	105	70		

Find the optimum quantity to be supplied from each shop to different warehouse at minimum cost.

(12 Marks)

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- b. Use Dominance Rule to find the optimum strategies for both the player.

(06 Marks)

	B ₁	B ₂	B ₃	B ₄	B ₅	B ₆
A ₁	4	2	0	2	1	1
A ₂	4	3	1	3	2	2
A ₃	4	3	7	-5	1	2
A ₄	4	3	4	-1	2	2
A ₅	4	3	3	-2	2	2

- 8 a. Define i) Total elapsed time ii) Idle time. (04 Marks)
 b. Find the sequence that minimized the total time required in performing the job on 3 machines in the order CBA. (16 Marks)

Machine			
Job	A	B	C
1	8	3	8
2	7	4	3
3	6	5	7
4	9	2	2
5	10	1	5
6	9	6	1

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10ME752

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
Theory of Plasticity

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting
at least TWO questions from each part.**

PART – A

- 1 a. Explain the following :
 i) Deviatoric stress
 ii) Octahedral stress
 iii) Spherical stress. (09 Marks)

- b. State of stress at a point is given by the following stress tensor.

$$\sigma_{ij} = \begin{bmatrix} 50 & 50 & -40 \\ 50 & -30 & 30 \\ -40 & 30 & -100 \end{bmatrix} \text{ MPa}$$

Calculate the stress invariants, principal stresses, spherical and Deviatoric stress tensor.

(11 Marks)

- 2 a. Explain the various factors affecting plastic deformation. Give examples. (10 Marks)
 b. Explain strain hardening phenomenon? What is the effect of strain hardening on plastic deformation? (10 Marks)

- 3 a. Explain cubical dilation of strain. (05 Marks)
 b. Strain tensor at a point is given by

$$\epsilon_{ij} = \begin{bmatrix} 0.0001 & 0.0002 & 0.0005 \\ 0.0002 & 0.0003 & 0.0004 \\ 0.0005 & 0.0004 & 0.0005 \end{bmatrix}$$

Determine octahedral normal and shearing strain, deviator and spherical strain tensor.

(15 Marks)

- 4 a. Explain the different stress – strain diagram employed to describe elastic – plastic behaviour of materials. (10 Marks)
 b. Explain the various theories of plastic flow. (10 Marks)

PART – B

- 5 a. If the state of stress at a point is given by $\sigma_x = 70\text{MPa}$, $\sigma_y = 120\text{MPa}$, $\tau_{xy} = 35\text{MPa}$. If the yield stress is 125MPa . Determine whether yielding will occur or not according to Tresca and Von Mises yield criteria's. (10 Marks)
 b. What do you understand by a yield criteria? Explain any two yield criterias commonly used. (10 Marks)

- 6 a. Explain the properties of slip line. (14 Marks)
 b. What assumptions are necessary to slip line field theory? (06 Marks)

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- 7 a. Derive the relation $\frac{M}{I_n} = \frac{\sigma}{y^n} = \frac{H}{R^n}$ in plastic bending for a material, following the non-linear stress strain law. (10 Marks)
- b. A rectangular beam of 80mm wide, 100mm deep and 3m long is simply supported at its ends, carrier a concentric load w. Determine magnitude of load w, if the beam is to yield at the outermost fibers by taking $\sigma_o = 250\text{MPa}$. Determine the value of the concentric load applied at the 20mm is to yield plastically and the whole of beam yields. Assume linear stress strain curve for the beam. (10 Marks)
- 8 a. Derive equation for theory of plastic torsion of a circular bar subjected to torsion for the following cases.
i) Incipient yielding
ii) Elasto plastic yielding
iii) Fully yielding (10 Marks)
- b. A circular shaft of inner radius 40mm and outer radius 100mm is subjected to a twisting couple so that the outer 20mm deep shell yields plastically. Determine the twisting couple applied to the shaft. Yield stress in shear for the shaft material is 145 N/mm^2 . Also determine the couple for full yielding. (10 Marks)

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10ME758

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
Total Quality Management

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1 a. Define Total Quality Management and discuss briefly the various dimensions of Quality. (10 Marks)
 b. Explain briefly the historical review of quality control. (04 Marks)
 c. With a neat block diagram, briefly explain TQM frame work. (06 Marks)
- 2 a. Define Leadership and briefly explain 12 behaviours or characteristics of a successful quality leader. (13 Marks)
 b. Elaborate the seven basic steps to strategic quality planning. (07 Marks)
- 3 a. Who is a Customer? Classify it. (08 Marks)
 b. With a neat sketch, enumerate how a KANO MODEL helps in translating needs in to requirement. (12 Marks)
- 4 a. Explain Juran's Trilogy and with a neat sketch elaborate chronic waste and sporadic waste of quality control. (16 Marks)
 b. Write short notes on the following : (10 Marks)
 i) PDSA cycle ii) Kaizen.

PART - B

- 5 a. What is Why Why analysis? Briefly explain how it is used to analyse root cause of a problem on the process, with an example. (08 Marks)
 b. With a neat sketch, explain the team generating creative ideas using an affinity diagram for scrambled ideas. (12 Marks)
- 6 a. Who developed Fish bone diagram? With a neat sketch, explain how cause and effect diagram are used to investigate the bad effect on the right side and root causes on the left of quality characteristics. (10 Marks)
 b. Explain chance cause and assignable cause with a neat diagram. Elaborate control chart for process with control limits. (10 Marks)
- 7 a. List out the problems associated by the organization in making the commitment towards Total Quality. (10 Marks)
 b. Write short notes on the following : (10 Marks)
 i) Change Management ii) Six sigma.
- 8 a. What is Concept Development? Explain QFD with a neat sketch using a case study. (12 Marks)
 b. List out the tools used for Design verification and explain any one of it. (08 Marks)

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10ME761

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
Experimental Stress Analysis

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting
at least TWO questions from each part.**

PART – A

- 1 a. What are the factors that should be considered while selecting a strain gage? What type of gauges you would recommend for high temperature strain measurements? How would you compensate for temperature changes? (10 Marks)
- b. What do you understand by a strain rosette? List the different types of strain rosette configuration currently in use. Discuss their uses and limitations. (10 Marks)
- 2 a. Define 'Gauge factor'. Derive an expression to determine the same for an electrical resistance strain gage. (10 Marks)
- b. Three strain gauges are applied to an area at a point in such a manner that gauge 'B' makes a positive angle of 30° with gauge 'A' and gauge 'C' makes a positive angle of 45° with gauge 'B'. The strain readings obtained from the gauges are as follows:

Gauge	A	B	C
Strain (μ strain)	-600	300	400

Calculate the principal strains, principal stresses and principal directions. Take $E = 200\text{GPa}$ and Poisson ratio $\mu = 0.3$ for the gauge material. (10 Marks)

- 3 a. Derive the stress optic law, as applied to two-dimensional photo elasticity. (10 Marks)
- b. Explain the calibration technique used for photoelastic circular disc under diametral compression. (10 Marks)
- 4 a. Explain the shear difference method for the separation of principal stresses. (10 Marks)
- b. What are the properties of an ideal photoelastic material? Discuss a few important photoelastic materials. (10 Marks)

PART – B

- 5 a. Explain stress freezing method procedure with a neat sketch. (10 Marks)
- b. Describe briefly the scattered light method of photoelastic stress analysis. Specify the advantages and limitations of this method. (10 Marks)
- 6 a. What are photoelastic coatings? What are their applications, advantages and limitations? (10 Marks)
- b. What are strip coatings? How can they be used to separate the principal stresses? (10 Marks)
- 7 a. What is Brittle coating technique? How it is useful for stress analysis? (04 Marks)
- b. Discuss the crack patterns which can be obtained in a brittle coating under various combinations of stresses. Illustrate your answer by giving sketches. (08 Marks)
- c. Describe the calibration method generally used for brittle coatings. How true threshold strains can be determined by this method? (08 Marks)
- 8 a. Explain briefly the phenomenon of Moire techniques used for the analysis of stresses. (10 Marks)
- b. Discuss briefly the applications and advantages of the Moire's method of stress analysis. Also list the limitations. (10 Marks)

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10ME762

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017**Tool Design**

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.**PART - A**

- 1 a. What are the steps involved in the design of a tool? Describe in brief. (12 Marks)
 b. Sketch and explain working principle of simplex pin type clamping mechanism. (08 Marks)
- 2 a. Considering the design of a drill bit, explain the following elements:
 (i) Back taper.
 (ii) Web thickness.
 (iii) Land width.
 (iv) Margin.
 (v) Tool geometry (10 Marks)
 b. Sketch and explain nomenclature of a milling cutter. (10 Marks)
- 3 a. List the difference between Jig and Fixture. (06 Marks)
 b. Sketch and explain Pin and Button locator used to support or hold the work piece. (08 Marks)
 c. What are the essential requirements of clamps and clamping devices? List different type of clamps used in the design of Jig. (06 Marks)
- 4 a. With a neat sketch, explain broaching fixture. (10 Marks)
 b. With a neat sketch, explain turning fixture. (10 Marks)

PART - B

- 5 a. Sketch and explain progressive die. (10 Marks)
 b. What is meant by die clearance? Discuss why angular clearance is necessary. (06 Marks)
 c. Determine cutting force required to pierce 4" square hole in 1020 steel material of 0.06" thick and having a shear strength of 20 tons/square inch. (04 Marks)
- 6 a. What causes spring back? With a neat sketch, explain corner setting method used to prevent spring back. (08 Marks)
 b. Sketch and explain double-action draw die. (08 Marks)
 c. List the factors affecting drawing. (04 Marks)
- 7 a. With a neat sketch explain combination die. (08 Marks)
 b. Give the composition of following die casting alloys: (08 Marks)
 (i) Zinc alloy.
 (ii) Aluminium alloy.
 (iii) Copper base alloy.
 (iv) Magnesium base alloy.
 c. List the advantages and limitations of die castings. (04 Marks)
- 8 a. With a neat sketch, explain injection moulding process. (08 Marks)
 b. With a neat sketch, explain blow moulding process. (08 Marks)
 c. List the advantages and limitations of injection molding process. (04 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.