# MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)
(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER -2018

Subject: Kinematics of Machine

Branch: ME (Readmitted Students)

Time: 3 hours   Max. Marks: 60

PART – A

Answer ALL questions of the following   **5x2Mark=10 Marks**

1. Explain coupling rod of a locomotive

2. Explain Robert mechanism?

3. How do you determine the direction of coriolis component of acceleration.

4. Define Knife edge follower with neat sketch.

5. State Law of Gearing.

PART-B

Answer any FIVE Questions of the following   **5x 10 Marks= 50Marks**

1. Write short notes on any two of the following:
   a) Give the Kutzbach criterion for planar mechanisms.
   b) With a neat sketch explain any one quick return mechanism of single Slider crank chain

2. (a) Sketch and explain the various inversions of double slider crank chain.
   (b) Types of joints.

3. What is the condition for correct steering? Sketch and explain the two main types of steering gears and their relative advantages.

4. a) Sketch and describe the Hart straight-line motion mechanisms .
   b) With a suitable diagram, explain how a pantograph works. What are its uses?

5. The mechanism, as shown in Fig, has the dimensions of various links as follows;
   AB = DE = 150 mm; BC = CD = 450 mm; EF = 375 mm.
   The crank AB makes an angle of45^0 with the horizontal and rotates about A in the clockwise direction at a uniform speed of 120 r.p.m. The lever DC oscillates about the fixed point D, which is connected to AB by the coupler BC. The block F moves in the horizontal guides, being driven by the link EF. Determine 1. Velocity of the block F, 2. Angular velocity of DC, and 3. Rubbing speed at pin C which is 50 mm in diameter.
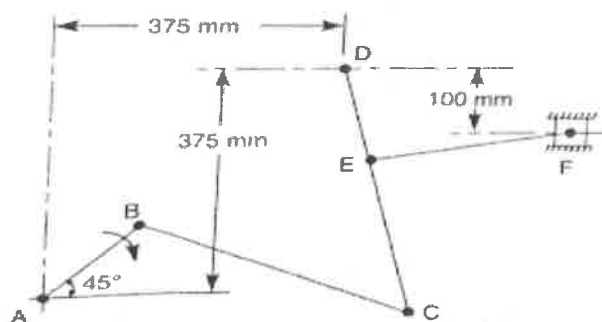
6. a) Determine the number of I-Centers for four bar and five bar mechanisms.

   b) Calculate the number of Instantaneous centres for a four bar chain through book keeping table and circle diagram.

7. A shaft which rotates at a constant speed of 160 r.p.m. is connected by belting to a parallel shaft 720 mm apart, which has to run at 60, 80 and 100 r.p.m. The smallest pulley on the driving shaft is 40 mm in radius. Determine the remaining radii of the two stepped pulleys for i) a crossed belt, and ii) an open belt. Neglect belt thickness and slip.

8. A Cam is to give following motion to a knife edge follower:(1) out stroke during 60^0 of cam rotation (2) DWELL for the next 30^0 of cam rotation (3) Return stroke during next 60^0 of cam rotation and (4) Dwell for the remaining 210 of cam rotation. The stroke of the follower is 40mm and the minimum radius of the cam is 50mm. The follower moves with uniform velocity during both the outstoke and the return strokes . draw the profile of the cam when the axis of the follower passes through the axis of the cam.

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II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER -2018

Subject: **DYNAMICS OF MACHINES**

Branch: ME

Time: **3 hours**

Max. Marks: 60

PART – A

Answer ALL questions of the following

5x2Mark=10 Marks

1. What is a Gyroscopic couple? Define angular momentum.
2. Describe the classifications of synthesis problem.
3. Explain how? The cone clutch is effective compared to the disk clutch with same inner and outer diameters.
4. Explain the terms 'under damping, critical damping' and 'over damping'
5. Write about any one of the dead weight governor?

PART-B

Answer any FIVE Questions of the following

5x 10 Marks= 50Marks

1. Derive all the necessary expressions for solving the following problem. A trolley car with a total mass of 3000 kg runs on rails at 1676 mm apart with a speed of 36 kmph. The track is curved with a radius of 50 m towards the right of the driver. The car has four wheels each of diameter 1 m and the total moment of inertia of the axels and wheels is 40 kg.m^2. The trolley is driven by a motor that runs at double the speed of the wheels in the direction opposite to the wheels. The motor and gears have a moment of inertia of 12 kg.m^2. Determine the vertical reaction offered by the rails on each of the wheels.

2. Derive all the necessary expressions for solving the following problem. The moment of inertia of a pair of locomotive driving wheels along with the axle is 250 kg.m^2. The distance between the wheel centers is 1.676 m and the diameter of the wheel treads is 1.8 m. Due to defective ballasting one wheel falls by 8 mm and raises again which can be assumed to be simple harmonic with a period of 12 seconds while the locomotive travels on a level track at 90 kmph. Determine the gyroscopic couple produced and its reaction between each of the wheel and the rails.

3. Figure shows a quaternary link ABCD under the action of forces F1, F2, F3 and F4 acting at A,B,C and D respectively. The link is in static equilibrium. Determine the magnitude of forces F2&F3 and the direction of F3
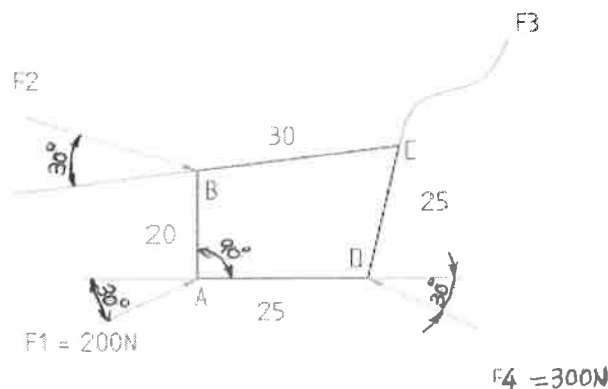
4. a) What are the conditions for a rigid body in static equilibrium?

b) Design a four bar link mechanism when the motions of the input and output links are governed by a function $y=x^2$ and x varies from 0 to 2 with an interval of 1. Assume θ to vary from 50^0 to 150^0 and $\emptyset$ from 80^0 to 160^0.

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

+ 52, – 124, + 92, – 140, + 85, – 72 and + 107 mm², when the engine is running at a speed of 600 r.p.m. If the total fluctuation of speed is not to exceed ± 1.5% of the mean, find the necessary mass of the flywheel of radius 0.5 m.
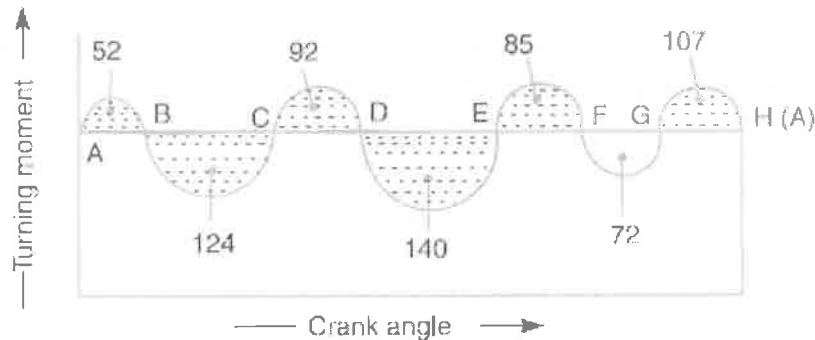
6. A) Explain the principle of cone clutch and centrifugal clutch.

B) The flywheel of a steam engine has a radius of gyration of 1m and mass 2500kg the starting torque of the steam engine is 1500N-m and may be assumed constant. Determine i) the angular acceleration of the flywheelii) the kinetic energy of the flywheel offer 10sec from the start.

7. A shaft carries four masses A, B, C and D of magnitude 200 kg, 300 kg, 400 kg and 200 kg respectively and revolving at radii 80 mm, 70 mm, 60 mm and 80 mm in planes measured from A at 300 mm, 400 mm and 700 mm. The angles between the cranks measured anticlockwise are A to B 45°, B to C 70° and C to D 120°. The balancing masses are to be placed in planes X and Y. The distance between the planes A and X is 100 mm, between X and Y is 400 mm and between Y and D is 200 mm. If the balancing masses revolve at a radius of 100 mm, find their magnitudes and angular positions.

8. A Hartnell governor has two rotating balls, of mass 2.7 kg each. The ball radius is 125 mm in the mean position when the ball arms are vertical and the speed is 150 r.p.m. with the sleeve rising. The length of the ball arms is 140 mm and the length of the sleeve arms 90 mm. The stiffness of the spring is 7 kN/m and the total sleeve movement is 12 mm from the mean position. Allowing for a constant friction force of 14 N acting at the sleeve, determine the speed range of the governor in the lowest and highest sleeve positions. Neglect the obliquity of the ball arms.

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II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER -2018

Subject: **Fluid Mechanics and Hydraulic Machines**

Branch: ME

Time: 3 hours   Max. Marks: 60

PART – A

Answer ALL questions of the following   5x2Mark=10 Marks

1. What is specific weight and mention its S.I unit.
2. Differentiate between rotational flows and irrotational flows?
3. Write the different types of major & minor losses.
4. What is inward radial flowturbine?
5. What is indicator diagram and mention its use in reciprocating pump?

PART-B

Answer any FIVE Questions of the following   5x 10 Marks= 50Marks

1. a). Find the power required to two lengthwise a plate 1.2m wide and 3m long at a velocity of 2.4 m/s in water at 23^0C. make allowance for the fact that the boundary layer will change from laminar to turbulence over the plate, υ for water at 23^0C is 0.9×10^{-6} m^2/s and $\rho = 1000$ kg/ m^3.
   b) Define capillarity? And explain with neat sketch for different fluid

2. a) Write a short notes on Piezo meter.
   b) Inverted U-tube manometer

3. a) Derive and explain Bernouli's equation with the help of Euler's equation.
   b) For flow through a venturimeter, obtain the relation for flow rate measurement. Explain its working principle.

4. a) Derive an expression for resultant force exerted on a pipe bend?
   b) A pipe of 30mm diameter conveying 2.5 lts/s of water has a right angled bend in a horizontal plane. Find the resultant force exerted on the bend if the pressure at inlet and outlet of the bend are 2.35 bar and 2.25 bar

5. Write short notes on
   (a) Boundary layer theory
   (b) Explain Lift force and Drag force.

6. a) Derive an expression for loss of head due to sudden Enlargement with neat sketch.
   b) A compound piping system consists of 1800 m of 0.50 m, 1200 m of 0.40m and 600m of 0.30 m new cast iron pipes connected in series. Convert the system to
   a) an equivalent length of 0.40m pipe, and
   b)An equivalent size pipes 3600m long.

7. a) Derive an expression for the force exerted by a jet on stationary inclined plate.
   b) Derive an expression for the force exerted by a jet on moving flat vertical plate.

8. a) A centrifugal pump with 1.2m diameter runs at 200rpm and pump at 1880 liters/S the average lift being 6m. The angle which the vanes makes at exit with tangent to the impeller is 26° and the radial velocity of flow is 2.5m/s. Determine manometer efficiency and least speed to start pumping against a head of 6m. the inner diameter of the impeller being 0.6m.
   b) How does a volute casing differ from a vertex casing for the Centrifugal pump.

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II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER -2018

Subject: **THERMAL ENGINEERING-1**

Branch: **ME**

Time: **3 hours**   Max. Marks: 60

PART – A

Answer ALL questions of the following   5x2Mark=10 Marks

1. Draw with a neat sketch of 4 Stroke Petrol Engine.

2. Explain about fuel requirement in SI Engine.

3. What is the use of heat balance sheet of an engine? Mention the various items to be determined to complete the heat balance sheet.

4. What is meant by Isothermal Efficiency?

5. What are different losses occurring in the centrifugal compressor due to different blade shapes? Explain

PART-B

Answer any FIVE Questions of the following   5x 10 Marks= 50Marks

1. a) What are the different methods of Lubricating IC engine and explain the Pressure system lubrication with a neat sketch.

    b) What is Air fuel ratio? And explain rich and lean mixture.

2. a)Explain Why cooling is necessary in an IC engine

    b) Discuss the Classification of IC Engines?

3. Explain about effect of variabels on Ignition Lag.

4. Briefly explain the various types of Combustion Chamber in CI engine.

5. a) A Six cylinder four stoke engine of 340 mm bore and 390 mm stroke was tested and the following information

    Engine speed = 360 rpm

    Brake power = 180 kW

    Mean effective pressure = 3.8 bar

    Fuel per minute of calorific value 45000kJ/kg = 0.77kg

    Flow of cooling water = 64 kg/min with a temperature rise of 9°C. Draw the heat balance sheet for the engine.

    b) Write short notes on Morse test

6. a) The brake thermal efficiency of a diesel engine is 30 per cent. If the air to fuel ratio by weight ' is 20 and the calorific value of the fuel used is 41800kJ/kg, what brake mean effective pressure may be expected at S.T.P. conditions?

   b) A 6-cylinder, four stroke gas engine with a stroke volume of 1.75 litres develops 26.3kW at 504 rpm. The m.e.p. is 6 bar. Find the average number of times each cylinder misfires in one minute.

7. a) Write short notes on Comparison between rotary and reciprocating compressor

   b) A Single acting reciprocating compressor has a piston diameter of 200 mm and a stroke of 300mm and runs at 350 rpm air is drawn at 1.1 bar and is delivered at 8 bar. The law of compression is $PV^{1.35}$ = Constant and the clearance volume is 6% of stroke volume. Determine the mean effective pressure and power required to drive the compressor.

8. a) What is meant by a stage of axial flow air compressor? and explain in detail about the stage velocity triangles.

   b) Derive the work input requirement for an axial flow air compressor and explain the salient points

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II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER -2018

Subject: **Production Technology**

Branch: ME

Time: 3 hours

Max. Marks: 60

PART – A

Answer ALL questions of the following

5x2Mark=10 Marks

1. List out the functions of core prints in casting process?

2. How soldering is different from brazing?

3. Differentiate cold and warm working?

4. Write the advantages of cold extrusion.

5. What is biodegradable plastic? Give examples.

PART-B

Answer any FIVE Questions of the following

5x 10 Marks= 50Marks

1. What is the function of riser? Discuss the Design of riser

2. What is gating ratio? What are the essential requirements of gating system?

3. Explain the principle of Resistance welding. What are the different types of resistance welding and explain anyone of them with a neat sketch.

4. a) What are the welding defects ? explain causes and remedies

   b) Differentiate Gas welding and Gas cutting.

5. Explain different types of wire drawing processes? also mention their advantages and limitations

6. a) Write short notes on Cold spinning b) Classify mechanical prosses. Explain flypress with neat sketch

7. With a neat sketch explain open die forging and closed die forging.

8. Define condensation polymerization which plastics make use of these process? Explain.

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II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER -2018
Subject: ENVIRONMENTAL SCIENCES
Branch: Common to CE & ME

Time: 3 hours

Max. Marks: 60

PART – A

Answer ALL questions of the following

5x2Mark=10 Marks

1. What are primary consumers? Give two examples.
2. Give two examples for alternative energy sources.
3. What is air pollution? Give any one cause for air pollution?
4. Define Kyoto Protocol?
5. Define population. Discuss major effects of population growth.

PART-B

Answer any FIVE Questions of the following

5x 10 Marks= 50Marks

1. a) Discuss the models of energy flow in an eco system.

   b) What is the scope and importance of an ecosystem?

2. a) List the main components of an Ecosystem. And briefly describe the functions of each.

   b) Difference between Food chain & Food web?

3. Write a note on environmental effect of mineral extraction and their uses.

4. Explain genetic biodiversity, species diversity and eco system biodiversity.

5. a) Discuss various measures to control vehicular pollution.

   b) Discuss how solid waste can be managed by industries.

6. a) Write short note on how does soil pollution affect soil productivity?

   b) Explain the adverse effects of air pollution.

7. a) Explain Climate change and their impacts on human health?

   b) Which are the agents responsible for ozone depletion?

8. Explain the following

   a) Environmental ethics and environmental economics.

   b) Conservation of resources.

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II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER -2018
Subject: **PROBABILITY & STATISTICS**
Branch: **Common to CE, ME & MINING**

Time: 3 hours   Max. Marks: 60

PART – A
Answer ALL questions of the following   5x2Mark=10 Marks
1. Define Probability
2. Define discrete and continuous random variables
3. Define type I and type II errors
4. Define t-test statistic
5. Explain briefly the structure of a queuing system

PART-B
Answer any FIVE Questions of the following   5x 10 Marks= 50Marks
1. Three machines produce 70%, 20% and 10% of the total number of a factory. The percentages of defective output of these machines are 4%, 3% and 2% respectively. An item is selected at random and found defective. Find the probabilities that it has been manufactured by machines I, II and III respectively.
2. A business man goes to hotels X, Y, Z 20%, 50%, 30% of the time respectively. It is known that 5%, 4%, 8% of the rooms in X,Y, Z hotels have faulty plumbing's.What is the probability that business man's room having faulty plumbing is assigned to hotel Z?
3. X is continuous random variable with p.d.f given by

$$f(x) = \begin{cases} \frac{1}{8}(x+1), fr\ 2 < x < 4 \\ 0, otherwise \end{cases}$$

   Then find E(X)?

4. X is continuous random variable with p.d.f given by f(x) =kx^2e^{-x} when x≥0, find (i) k, (ii) Mean (iii) Variance.
5. a) Suppose 5% of the components produced by a machine were defective. After overhauling of the machine, 12 components were observed to be defective in a random sample of 400 components. Has the machine improved?
   b) A random sample of size 81 was taken whose variance is 20.25 and mean is 32, construct 95% confidence interval.
   c) What is the difference between point estimate and interval estimate?
6. a) Explain the general procedure of testing a hypothesis
   b) Define (i) population (ii) sample (iii) Estimation
7. The heights of six randomly chosen sailors are in inches :63,65,68,69,71and 72.Those of 10 randomly chosen soldiers are 61,62,65,66,69,70,71,72 and 73.Discuss ,the heights of these data throw on the suggestion that sailors are on the average taller than soldiers?
8. Find the regression lines of Y on X and X on Y for the following data

X	1	2	3	4	5
Y	2	5	3	8	7