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**R-11/R-13**

**Code : 1GC43**

*II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016*

**Environmental Science**

*( Common to CE, ME and CSE )*

**Max. Marks: 70**

**Time: 03 Hours**

*Answer any five questions*

*All Questions carry equal marks (14 Marks each)*

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1. a) Define environment? Explain the branches of Environmental education. 7M  
b) What is a Biosphere? Discuss its significance. 7M
2. Write a brief note on.  
a) a) Floods. 7M  
b) b) Use of alternate energy resources. 7M
3. a) What are the environmental hazards associated with mineral extraction. 7M  
b) Discuss, we live in a world where in natural resources are limited? 7M
4. a) Discuss the effects and control measures of marine pollution. 7M  
b) Write a brief account of solid waste management. 7M
5. Discuss the structure and functions of forest ecosystem. 14M
6. a) List the main biogeographic zones in India. 8M  
b) What is biodiversity? Write a note on poaching of wild life. 6M
7. a) What are the causes effects and control measures of Global warming? 8M  
b) Write a short note on waste land reclamation. 6M
8. a) Explain the necessity of value education. 7M  
b) What is the role of information technology (IT) in environment and human health? 7M

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R-11/R-13

Code : 1G543

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

**Fluid Mechanics & Hydraulic Machines**

( Mechanical Engineering )

Max. Marks: 70

Time: 03 Hours

Answer any **five** questions

All Questions carry equal marks (14 Marks each)

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1. Define the following fluid properties?  
Density, weight Density, Specific Volume and Specific Gravity 14M
  
2. State and prove Bernoulli's equation and state the assumptions made for the same? 14M
  
3. Two reservoirs are connected by 3 pipes laid in parallel their diameters are D, 2D, 3D respectively and they are of the same length L assuming f to be same for all pipe determine the discharge through each of the large pipe if the smallest pipe is discharging  $1\text{m}^3/\text{sec}$ . 14M
  
4. A jet of water moving at 15 m/sec impinges on a symmetrical concave vane shaped to deflect the jet through  $140^\circ$ . If the vane is moving at 6 m/sec find the angle of the jet so there is no shock at inlet. Also determine the absolute velocity of exit in magnitude & direction and the work done per unit weight of water. 14M
  
5. Explain the following terms 14M
  - a. Catchment area
  - b. Runoff
  - c. Mass curve
  - d. Pumped storage system
  
6. Give the basic Classification of hydraulic turbines and state the major differences among them? 14M
  
- 7 a) Explain the necessity of governing of a hydraulic turbine with suitable diagram 6M  
b) A turbine develops 7460 kW under the head of 24.7 m at 135 rpm. What is the specific speed? What would be its normal speed and output under a head of 19.5 m. 8M
  
- 8 A single acting reciprocating pump has piston of diameter 150 mm and stroke length of 250 mm. The piston makes 50 double strokes per minute. The suction and delivery heads are 5m and 15m respectively. Find discharge capacity of the pump in liters per minute. Force required to work the piston during the suction and delivery strokes if the efficiency of suction and delivery are 60% and 70% respectively and also find the power required to operate the pump 14M

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Code : 1G541

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

**KINEMATICS OF MACHINERY**

( Mechanical Engineering )

**Max. Marks: 70****Time: 03 Hours**Answer any **five** questions

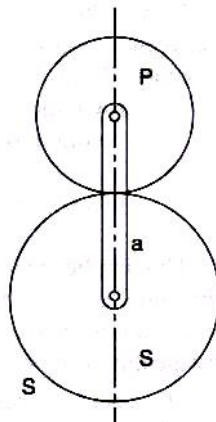
All Questions carry equal marks (14 Marks each)

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1. What is an inversion? Explain any two inversions of single slider crank chain.
2. a) Name the mathematically correct straight line mechanisms.  
b) With a neat sketch explain Ackermann steering mechanism.
3. In a slider crank mechanism, the crank OB is 30 mm and the connecting rod BC is 120 mm long. The crank rotates at 300 rpm clockwise and makes 600 from IDC. Find i) the velocity of piston C and angular velocity of connecting rod BC.
4. In a four bar mechanism PQRS, PS is fixed link of length 120 mm. Crank PQ is 45 mm rotates at 200 rpm and an angular acceleration of 150 rad / sec<sup>2</sup> at an instant when crank makes an angle 45° to the horizontal. Both are clockwise in nature. The link QR is 90 mm and link RS is 60 mm. Find the acceleration of points Q and R.
5. A cam with 40 mm minimum radius is rotating clockwise at uniform speed of 1200 rpm. It has to operate a knife edge follower as defined below:
  - i) Follower has to move outward through 30 mm during 90° of cam rotation with uniform velocity
  - ii) Dwell for the next 30°
  - iii) Follower is to return to its starting position with SHM during next 120°.
  - iv) Follower is to dwell for the remaining period.

Draw the cam profile taking the line of action of the follower passing through the center of the cam. Determine the maximum velocity and acceleration of the follower during the return stroke.

6. Two wheels 24 teeth and 30 teeth and standard addendum equals to one module mesh together. Module is 3 mm. Pressure angle is 20°. Find the length of path of contact, arc of contact and no of pairs of teeth in contact.
7. An open flat belt drive is required to transmit 9 kW of power from a motor running at 900 rpm to another pulley to rotate at 300 rpm. The belt is 12 mm thick and has an allowable stress as 2.5 N / mm<sup>2</sup>. The two shafts are 1.2 m apart. The diameter of the smaller pulley is 180 mm. Belt weighs 1 kg / m length. Coefficient of friction is 0.3. Find the width of the belt.
8. An epicyclic gear train consists of an arm 'a' and two gears P and S having 30 teeth and 50 teeth respectively. The arm rotates about the centre of the gear S at a speed of 120 rpm clockwise. Determine the speed of gear P for the following conditions:
  - i) If gear S is fixed and
  - ii) the gear S rotates at 180 rpm counterclockwise instead of being fixed.



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**Mathematics – III**

( Common to EEE &amp; ECE )

Max. Marks: 70

Time: 3 Hours

Answer any **five** questionsAll Questions carry equal Marks (**14 Marks** each)

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1. a) Evaluate  $\int_0^{f/2} \sqrt{\tan u} du$ . 7M
- b) Prove that  $s(m, 1/2) = 2^{2m-1} s(m, m)$ . 7M
2. a) Prove that the function  $f(z)$  defined by  

$$f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2 + y^2} \quad (z \neq 0), \quad f(0) = 0$$
is continuous at the origin, but the Cauchy's Riemann equations are not satisfied at the origin, yet  $f'(0)$  does not exist. 7M
- b) Find the analytic function, whose real part is  $\frac{\sin 2x}{\cosh 2y - \cos 2x}$ . 7M
3. a) If  $\cosh(u+iv) = x+iy$  then prove that  

$$\frac{x^2}{\cosh^2 u} + \frac{y^2}{\sinh^2 u} = 1 \quad \text{and} \quad \frac{x^2}{\cos^2 v} - \frac{y^2}{\sin^2 v} = 1.$$
 7M
- b) Find all the roots of the equation  $\tanh z + 2 = 0$ . 7M
4. a) State and prove Cauchy's integral formula. 7M
- b) Evaluate  $\int_c \frac{\sin^2 z}{(z - i/6)^3} dz$  where  $c$  is the circle  $|z|=1$ . 7M
5. a) Find the Taylor's expansion of  $f(z) = \frac{1}{(z+1)^2}$  about the point  $z=-i$ . 7M
- b) Expand  $f(z) = \frac{1}{(z-1)(z-2)}$  in the regions (i)  $|z| < 1$ , (ii)  $1 < |z| < 2$ . 7M
6. a) Using Residue theorem, evaluate  $\int_c \tan z dz$  where  $c$  is the circle  $|z|=2$ . 7M
- b) By Integrating around a unit circle, evaluate  $\int_0^{2\pi} \frac{\cos 3u}{5 - 4 \cos u} du$ . 7M
7. a) State and prove Rouché's theorem. 7M
- b) Prove that the polynomial  $z^5 + z^3 + 2z + 3$  has just one zero in the first quadrant of the complex plane. 7M
8. a) Find the image of the infinite strip  $0 < y < 1/2$  under the transformation  

$$w = \frac{1}{z}$$
 7M
- b) Find the Bilinear transformation which maps the points  $(1, i, 0)$  in the  $z$ -plane into  $(-1, -i, 1)$  in the  $w$ -plane. 7M

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Hall Ticket Number :

R-11/R-13

Code : 1G544

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

### Manufacturing Technology

( Mechanical Engineering )

Max. Marks: 70

Time: 03 Hours

Answer any **five** questions

All Questions carry equal marks (14 Marks each)

Illustrate your answers with NEAT sketches wherever necessary

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1. a) What are the different types of patterns used in Foundry practice? Describe with neat sketches, and mention the applications of each type. 8M

- b) A particular sand has produced the following results on Sieve analysis :

| Sieve No.  | 70   | 100   | 140   | 200   | 270  | Pan  |
|------------|------|-------|-------|-------|------|------|
| Retained % | 0.04 | 1.01. | 45.21 | 48.02 | 5.38 | 0.36 |

Calculate the grain fineness number. 6M

2. a) Describe the design considerations of sand castings, with relevant sketches. 8M

- b) A certain mould has a sprue whose length is 20 cm, and the cross sectional area at the base of the sprue is 2.5 cm<sup>2</sup>. The sprue feeds a horizontal runner leading into a mould cavity whose volume is 1560 cm<sup>3</sup>. Determine :

(i) the velocity of the metal at the base of the sprue, (ii) volume rate of flow, and (iii) the time to fill the mould. 6M

3. a) What are the defects that might arise in Forge welding? Explain. 6M

- b) Discuss the Troubleshooting methods for the common Electric Arc Welding problems. 8M

4. a) Distinguish between Welding, Soldering, and Brazing *with respect to* their principle of operation, applications, and the materials to which they can be used. 7M

- b) Describe any four non – destructive testing methods of welds. 7M

5. a) How does 'Strain hardening' occur in Cold Working? Can it be removed / reduced by subsequent Annealing? If so, how? Explain. 8M

- b) Explain any **six** differences between hot rolling and cold rolling processes. 6M

6. a) Suppose a steel wire is to be drawn to 24% reduction from an initial diameter of 10 mm. Given the flow stress of the material, the semi die angle, and the coefficient of friction, describe the procedure to calculate the draw stress and the power required for the deformation if the wire moves at a speed of 2.5 m/s. 8M

- b) Distinguish between Blanking and Piercing operations. Sketch the equipment used. 6M

7. a) Explain the differences between Drop Forging, Roll forging, and Rotary forging. Give the relevant sketches. 8M

- b) Distinguish between Impact extrusion and Hydrostatic extrusion with relevant sketches, and mention their applications. 6M

8. a) In Abrasive jet machining process, with the help of sketches, show the effect of **stand – off distance** on (i) the width of cut, and (ii) material removal rate. 7M

- b) Ultrasonic machining is used for drilling a hole (under the same machining conditions) in Aluminium and Cast Iron. Which one will have higher depth of the drilled hole? Justify your answer. 7M

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Code : 1G542

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

**Thermal Engineering - I**  
( Mechanical Engineering )

Max. Marks: 70

Time: 03 Hours

Answer any **five** questions

All Questions carry equal marks (14 Marks each)

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1. a) An engine of 250 mm bore and 375 mm stroke works on Otto cycle. The clearance volume is  $0.00263 \text{ m}^3$ . the initial pressure and temperature are 1 bar and  $50^\circ \text{C}$ . if the maximum pressure is limited to 25 bar, find the following:
  - i) The air standard efficiency of the cycle.
  - ii) The mean effective pressure of the cycle.
 Assume the ideal conditions. 7M
- b) Derive expression for efficiency in the following cases:
  - i) Carnot cycle
  - ii) Diesel cycle
  - iii) Dual combustion cycle7M
2. a) Explain the construction and working principle of Battery coil ignition system with neat sketch 7M
- b) Discuss the construction and working principle of a four stroke engine with neat sketch 7M
3. a) Explain the phenomena of knocking in diesel engines. What are the different factors which influence the knocking? 7M
- b) Discuss the difference between Normal/abnormal combustion and pre ignition 7M
4. a) What are the variables affecting the "Delay Period"? 7M
- b) The flow rate through steam nozzle with isentropic flow from pressure of 13 bar was found to be 60 kg/min. steam is initially saturated. Determine the throat area. If the flow is super saturated, determine the increase in the flow rate. 7M
5. Following data relate to 4 cylinder four stroke petrol engine. Air fuel ratio by weight =16:1, calorific value of the fuel = 45200 kJ/kg, mechanical efficiency = 82%, air standard efficiency = 52%, relative efficiency = 70%, volumetric efficiency =78%, stroke/bore ratio =1.25, suction condition = 1 bar and  $25^\circ \text{C}$ , speed =2400 rpm and power at brakes =72 kW. Calculate the :
  - i) Compression ratio ii) Indicated thermal efficiency iii) Brake specific fuel consumption and iv) Bore and stroke.14M
6. a) In the construction and working of Multi stage compressor and discuss the perfect and imperfect inter cooling with neat sketch. 7M
- b) A single stage, single acting reciprocating air compressor has a bore of 0.2 m and stroke of 0.3 m. It receives air at 1 bar and 293 K and delivers it at 5.5 bar. If the compression follows the law  $pV^{1.3} = \text{constant}$  and clearance volume is 5% of the stroke volume, Determine the mean effective pressure and the power required to drive the compressor, if it runs at 500 rpm. 7M
7. a) Explain the rotary screw compressor with a neat sketch 7M
- b) A rotary vane compressor compresses  $4.5 \text{ m}^3$  of air per minute from 1 bar to 2 bar when running at 450 rpm. Find the power required to drive the compressor when i. The ports are so placed that there is no internal compression; and ii. The ports are so placed that there is 50% increase in pressure due to compression before the backflow occurs. 7M
8. a) Explain the velocity diagrams for Axial flow compressor 7M
- b) An axial flow compressor, with compression ratio 4, draws air at  $20^\circ \text{C}$  delivers it at  $197^\circ \text{C}$ . The mean blade speed and flow velocity are constant throughout the compressor. Assuming 50% degree of reaction balding and taking blade velocity as 180 m/s. find the flow velocity and the number of stages. Take work factor =0.82;  $\alpha = 12^\circ$ ;  $\beta = 42^\circ$  and  $C_p = 1 \text{ kJ/kg} \cdot \text{K}$ . 7M

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