

University of Mumbai
Examination 2020 under cluster 09 (FAMT)
Examinations Commencing from 7th January 2021 to 20th January 2021
Program: MECHANICAL ENGINEERING
Curriculum Scheme: Rev2016

Examination: BE

Semester VII

Course Code: MEC701

Course Name: MACHINE DESIGN-II

Time: 2 hour

Max. Marks: 80

| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
|-----------|--|
| 1. | The bearing number 6210 indicates that the bearing is having bore diameter _____ |
| Option A: | 10 mm |
| Option B: | 20mm |
| Option C: | 40mm |
| Option D: | 50mm |
| 2. | The gears are termed as medium velocity gears, if their peripheral velocity is _____ |
| Option A: | 1-3 m/s |
| Option B: | 3-15 m/s |
| Option C: | 15-30 m/s |
| Option D: | 30-50 m/s |
| 3. | The variation in chain speed is due to _____ |
| Option A: | Creep |
| Option B: | Slip |
| Option C: | Backlash |
| Option D: | Chordal action |
| 4. | A zero film bearing is a bearing _____ |
| Option A: | Where the surfaces of journal and the bearing are separated by a thick film of lubricant |
| Option B: | Where the surfaces of journal and the bearing are partially separated by a film of lubricant and there is partial metal to metal contact |
| Option C: | Where the surfaces of journal and the bearing are separated by a film created by elastic deflection of parts |
| Option D: | Where there is no lubricant |
| 5. | What should be the minimum number of teeth on the sprocket in case of chain drive in order to keep speed variation less than 1%. |
| Option A: | 17 |
| Option B: | 21 |
| Option C: | 24 |
| Option D: | 30 |
| 6. | If T is the actual number of teeth on a helical gear and \emptyset is the helix angle for the teeth, the formative number of teeth is written as _____ |
| Option A: | $T \sec^3 \emptyset$ |
| Option B: | $T \sec^2 \emptyset$ |
| Option C: | $T / \sec^3 \emptyset$ |
| Option D: | $T / \operatorname{cosec} \emptyset$ |

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| 7. | Temperature rise in partial bearing is _____ than full bearing. |
| Option A: | Lesser |
| Option B: | Greater |
| Option C: | Equal |
| Option D: | Undeterminable |
| 8. | Crowning of a flat belt pulley is done _____. |
| Option A: | To Prevent the slipping of a belt |
| Option B: | To increase the tension of a belt |
| Option C: | To increase the angle of contact |
| Option D: | To decrease the slip |
| 9. | Prime circle radius means _____ |
| Option A: | Radius of base circle + radius of roller follower |
| Option B: | Radius of base circle - radius of roller follower |
| Option C: | Radius of base circle |
| Option D: | Radius of pitch circle |
| 10. | A pair of straight bevel gears consists of 16 pinion teeth and 42 gear teeth. What are the pitch cone angles of pinion and gear? |
| Option A: | 67.60 degree & 22.40 degree |
| Option B: | 52.14 degree & 37.86 degree |
| Option C: | 20.85 degree & 69.15 degree |
| Option D: | 35.12 degree & 54.88 degree |
| 11. | The displacement equation for uniform velocity is _____, where h is maximum rise of follower, θ is cam angle for displacement, β is cam angle for rise h |
| Option A: | $h \theta / \beta$ |
| Option B: | $h \theta / \beta^2$ |
| Option C: | $h \theta / 2\beta$ |
| Option D: | $2h \theta / \beta$ |
| 12. | When the length of journal is greater than the diameter of the journal then the bearing is said to be _____ |
| Option A: | Short bearing |
| Option B: | Long bearing |
| Option C: | Medium bearing |
| Option D: | Square bearing |
| 13. | The property of a bearing material which has the ability to accommodate small particles of dust, grit etc., without scoring the material of the journal, is called _____ |
| Option A: | Bondability |
| Option B: | Embeddability |
| Option C: | Comformability |
| Option D: | Fatigue strength |
| 14. | During braking the brake shoe is moved outward to press against the _____ |
| Option A: | Wheel piston or cylinder |
| Option B: | Brake lining |
| Option C: | Brake drum or disc |
| Option D: | Wheel rim or axle |
| 15. | Number of starts used on the worm for velocity ratio 36 and above is _____ start |
| Option A: | Single |
| Option B: | Double |

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| Option C: | Triple |
| Option D: | Quadruple |
| 16. | In case of a multiple disc clutch, if n_1 are the number of discs on the driving shaft and n_2 are the number of the discs on the driven shaft, then the number of pairs of contact surfaces will be _____ |
| Option A: | $n_1 + n_2$ |
| Option B: | $n_1 + n_2 - 1$ |
| Option C: | $n_1 + n_2 + 1$ |
| Option D: | $n_1 - n_2$ |
| 17. | Sommerfeld no is given by _____ where, Z is absolute viscosity of lubricant, N is speed of journal, p is bearing pressure, d is diameter of journal and c is diametral clearance. |
| Option A: | $(ZN/p) (d/c)^2$ |
| Option B: | $(ZN/p) (d/c)$ |
| Option C: | $(ZN/p) (2d/c)$ |
| Option D: | $(ZN/p) (d/2c)$ |
| 18. | Which type of brakes have wooden blocks placed inside flexible steel band? |
| Option A: | Band and Block brake |
| Option B: | Band brake |
| Option C: | Block brake |
| Option D: | Pivoted block brake |
| 19. | Offset is provided to a cam follower mechanism to _____ |
| Option A: | minimize the side thrust |
| Option B: | accelerate |
| Option C: | avoid jerk |
| Option D: | maximize the side thrust |
| 20. | Brake efficiency is a term which denotes _____ |
| Option A: | Efficiency of the braking system as a whole |
| Option B: | Efficiency of the braking linings |
| Option C: | The deceleration as percentage of gravity |
| Option D: | Efficiency of the operating linkage |

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| Q2. (20 Marks) | Solve any Two questions out of three questions 10 marks each i) Assume suitable data if necessary, ii) Use of Design Data book is permitted |
| A | A worm reduction unit is required to transmit 15 KW from an electric motor operating at 1440 rpm. The output speed is 72 rpm and the load is with mild shock, duty normal. i) Select suitable material and stresses, design worm and worm wheel for strength and wear. ii) Check the unit for heat dissipation capacity and modify the dimension if necessary. |
| B | The turning moment diagram for a petrol engine is drawn to the following scale: turning moment 1mm = 6 N-m, crank angle 1mm = 1 degree. The turning moment diagram repeats itself every half revolution of the engine and the area above and below the mean torque line taken in order are 295, 685, 40, 340, 960, 270 mm ² . Determine the mass of 400 mm diameter of flywheel rim when the coefficient of fluctuation of speed is 0.3% and the engine runs at 1700 rpm. Also determine the cross section of the rim when width of the rim is twice of thickness. Assume density of rim material as 7250 Kg/m ³ |

| | |
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| C | <p>An electric motor is coupled to a machine through multiple clutch operation under dry condition. The clutch is required to transmit 10kW at 740 rpm. The frequency of operation is 32 in 8 hours. Due to space constraint overall size of clutch is limited to 250 mm in radial direction. Design the following components.</p> <p>i) Input shaft ii) Output shaft iii) Friction plates</p> |
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|---------------------------|---|----------------------|
| Q3. (20 Marks) | Solve any Two questions out of three questions | 10 marks each |
| | <p>i) Assume suitable data if necessary, ii) Use of Design Data book is permitted</p> | |
| A | <p>Determine the maximum velocity and acceleration from the motion analysis of the rotary disc cam with central translatory roller follower. Forward stroke 25 mm in 70 degree of cam rotation with cycloidal motion, dwell of 30 degree of cam rotation and return stroke of 25 mm in 50 degree of cam rotation in SHM and remaining dwell. Mass of follower is 1 Kg. Cam speed is 600 rpm. Maximum pressure angle during forward stroke and return stroke is 25 degree. The external force during forward stroke is 400N and during return stroke is 100N.</p> | |
| B | <p>A deep groove ball bearing is to be selected for an intermediate shaft of an helical gear box which is subjected to an axial load of 5 KN and a radial load of 10 KN when operate at 500 rpm. Select suitable size of bearing if it is required to have a life of 20000 hrs with a probability of survival 92%.</p> | |
| C | <p>A pair of helical gear is used to transmit power from an electric motor rated at 50 KW, 960 rpm. The motor is coupled to the pinion shaft and reduction ratio is approximately 4.2. The helix angle is 17°. The gears are with 20° pressure angle full depth involute profile.</p> <p>i) Select suitable material and design stresses. ii) Using Lewis equation and Barth velocity factor determine module and face width.</p> | |

University of Mumbai
Examination 2020 under cluster 9 (FAMT)
Examinations Commencing from 7th January 2021 to 20th January 2021
Program: **Mechanical Engineering**
Curriculum Scheme: **2016**
Examination: BE Semester VII
Course Code: **MEC702** and Course Name: **CAD/CAM/CAE**

Time: 2-hour

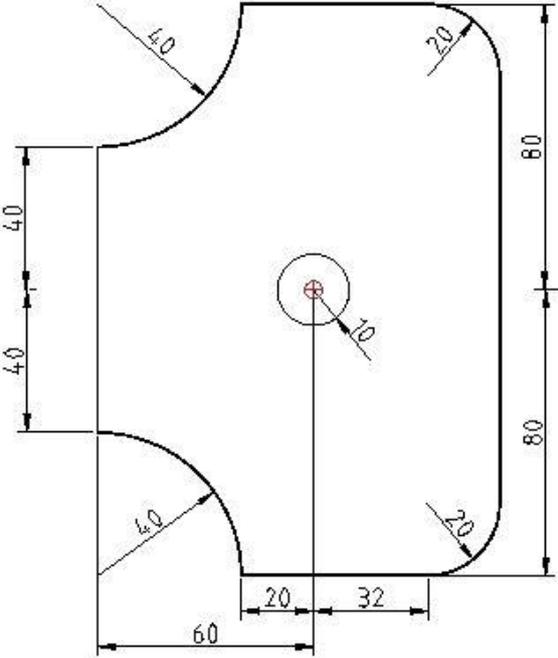
Max. Marks: 80

| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
|-----------|---|
| 1. | The degree of the Bezier curve with n-1 control points is: |
| Option A: | n+1 |
| Option B: | n-1 |
| Option C: | 2n |
| Option D: | n |
| 2. | Block to move from point A (25,10) to B (40,20) in incremental mode will be |
| Option A: | N001 G91 G01 X40 Y20 F100; |
| Option B: | N001 G91 G01 X15 Y10 F100; |
| Option C: | N001 G90 G01 X40 Y20 F100; |
| Option D: | N001 G90 G01 X15 Y10 F100; |
| 3. | Which of the following is NOT a miscellaneous function |
| Option A: | Coolant on/off |
| Option B: | Canned Cycles |
| Option C: | Tool change |
| Option D: | Spindle on/off |
| 4. | Kinematic analysis is simulation of |
| Option A: | Motion |
| Option B: | Motion and deformation |
| Option C: | Deformation |
| Option D: | Deformation and stress |
| 5. | In a vertical Milling machine, Z zero is generally considered |
| Option A: | Above the top surface of the work piece |
| Option B: | At the top surface of the work piece |
| Option C: | At the bottom face of the work piece |
| Option D: | Below the bottom face of the work piece |
| 6. | A line is completely outside the window if.....as per Cohen-Sutherland algorithm, |
| Option A: | The endpoints region code are nonzero values |
| Option B: | The region codes of line endpoints have a '1' in same bit position. |
| Option C: | If L bit and R bit are nonzero. |
| Option D: | The region codes of line endpoints have a '0' in same bit position. |
| 7. | Transformation becomes geometric transformation when _____operations |

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| | are performed on it |
| Option A: | Physical |
| Option B: | Mathematical |
| Option C: | Chemical |
| Option D: | Mechanical |
| | |
| 8. | Convex hull is the one of the properties of _____ Curve. |
| Option A: | BSpline |
| Option B: | Bezier |
| Option C: | Hermite cubic |
| Option D: | NURBS |
| | |
| 9. | Working coordinate system is also known as |
| Option A: | World coordinate system |
| Option B: | Global coordinate system |
| Option C: | Model coordinate system |
| Option D: | Local coordinate system |
| | |
| 10. | Which of the following is the pre-processing stage in RP? |
| Option A: | Remove support |
| Option B: | Checking 3D CAD data |
| Option C: | De-powdering loose material |
| Option D: | Dip in binder to strengthen the part |
| | |
| 11. | Convenient value for "Homogeneous Coordinates" is |
| Option A: | 0 |
| Option B: | 2 |
| Option C: | 1 |
| Option D: | 3 |
| | |
| 12. | Both 3D Printer (3DP) and Selective Laser Sintering (SLS) method uses powder as the starting material. However, what is the difference between these two methods. |
| Option A: | 3DP uses a binding agent; SLS uses a laser |
| Option B: | 3DP uses a laser; SLS uses a binding agent. |
| Option C: | 3DP uses a filament extruder; SLS uses a binding agent |
| Option D: | 3DP uses a filament extruder; SLS uses a laser |
| | |
| 13. | CIM is an example of the implementation of _____ and common _____ in manufacturing. |
| Option A: | System, Philosophy |
| Option B: | Information, Technologies |
| Option C: | Design, Program |
| Option D: | Quality function, Goal |
| | |
| 14. | Following is one of the effects observed on the surface of RP parts. |
| Option A: | Steering effect |
| Option B: | Staircase effect |
| Option C: | Streaming effect |
| Option D: | Shearing effect |

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| 15. | Which one of the following is purely social aspects of CIM? |
| Option A: | Increase in profit |
| Option B: | Increase in plant efficiency |
| Option C: | Increase in unemployment |
| Option D: | Down sized workforce |
| 16. | CIM deals with one of the below mentioned extra functions as compared to CAD and CAM |
| Option A: | Manufacturing functions |
| Option B: | Design functions |
| Option C: | Business functions |
| Option D: | Production, Planning and Control |
| 17. | Which one of the following is the most crucial tasks in CIM? |
| Option A: | Finance management |
| Option B: | Purchase management |
| Option C: | Ware housing management |
| Option D: | Information management |
| 18. | RP technology is best suitable for medical application due to its, |
| Option A: | Efficiently shape and produce prostheses and implants |
| Option B: | Ability to efficiently customize and produce prostheses and implants |
| Option C: | Sufficient flexibility to handle the implants during surgery |
| Option D: | Ability to produce the prostheses in mass. |
| 19. | The scope and coverage of CIM as compared to CAD CAM is |
| Option A: | Broader |
| Option B: | Smaller |
| Option C: | Narrow |
| Option D: | Medium |
| 20. | Which of the following process is suitable to avoid sharp corner? |
| Option A: | LOM |
| Option B: | SLS |
| Option C: | 3D printing |
| Option D: | FDM |

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| Q2 | Answer any Four out of Six (5 marks each) |
| A | Compare the work coordinate system for Vertical Milling and Horizontal Lathe machine. |
| B | Explain constructive solid geometry with suitable example. |
| C | State the importance of CAE. |
| D | Write short note on Artificial Intelligence in Design and Manufacturing. |
| E | Write short note on Rapid Tooling. |
| F | Explain the nature and role of CIM element |

| Q3 | Solve any Two Questions out of Three (10 marks each) | |
|----|---|--|
| | <p data-bbox="359 199 1401 304">Write CNC program using G and M codes to contour the component and drill center hole of radius 10mm for the sketch in figure 1. Assume thickness to be 25 mm. Assume suitable data for speed and feed.</p>  <p data-bbox="842 1055 954 1093" style="text-align: center;"><i>Figure 1</i></p> | |
| B | Find the equation of a Bezier curve for control points as P0 (1, 2), P1 (3, 4), P2 (6, -6) and P3 (10, 8). Find the coordinate and draw the curve. | |
| C | A triangle with vertices A (1, 1), B (2, 1) and C (2, 3) has to be rotated by 30 degree counter clockwise about a point P (3, 2). Determine the composite transformation matrix and find the new co-ordinates of triangle | |

University of Mumbai
Examination 2020 under cluster 9 (FAMT, Ratnagiri)
Examinations Commencing from 7th January 2021 to 20th January 2021

Program: Mechanical Engineering

Curriculum Scheme: Rev 2016

Examination: BE Semester VII

Course Code: MEC703 and Course Name: Production Planning and Control

Time: 2 hour

Max. Marks: 80

| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
|-----------|---|
| 1. | The routing function in a production system design is concerned with |
| Option A: | Manpower utilization |
| Option B: | Quality assurance of the product |
| Option C: | Machine utilization |
| Option D: | Optimizing material flow through the plant |
| 2. | Material Requirement Planning typically determine |
| Option A: | How to order |
| Option B: | What to order |
| Option C: | Where to order |
| Option D: | When to order |
| 3. | There are 3 workstations in the assembly flow line and their time consumption is 4min, 5min, 3min respectively. What is the efficiency of the assembly line? |
| Option A: | 100% |
| Option B: | 80% |
| Option C: | 75% |
| Option D: | 70% |
| 4. | Given the data 92, 93, 92, 91, 93, 94, 92 find the forecast range for the eighth period using Simple average |
| Option A: | 92.00 - 93.00 |
| Option B: | 94.00 - 95.00 |
| Option C: | 91.00 - 92.00 |
| Option D: | 93.00 - 94.00 |
| 5. | A work shift is for 8 hours duration; 30 minutes lunch break and two 15 minutes (each) tea breaks are allowed per shift. If products are to go out after assembly at the rate of 60 per shift, and total assembly time content for a product is 42 minutes, then minimum number of work stations needed is: |
| Option A: | 8 |
| Option B: | 12 |

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| Option C: | 6 |
| Option D: | 5 |
| | |
| 6. | A manufacturer has to supply his customers 3000 units of his product per year. Inventory carrying cost is Re. 1 per annum and the set up cost per run is Rs. 100. What is the EOQ in units? |
| Option A: | 775 |
| Option B: | 675 |
| Option C: | 575 |
| Option D: | 625 |
| | |
| 7. | Which one of the following is not an input to the manufacturing system? |
| Option A: | Man |
| Option B: | Information |
| Option C: | Energy |
| Option D: | R & D |
| | |
| 8. | Following is NOT the selective control of inventory |
| Option A: | ABC analysis |
| Option B: | HML analysis |
| Option C: | PQR analysis |
| Option D: | SOS analysis |
| | |
| 9. | In an assembly line for assembling toys, five workers are assigned each task, which take times of 10, 8, 6, 9 and 10 minutes respectively. The balance delay for assembly the line is |
| Option A: | 43.5% |
| Option B: | 14.8% |
| Option C: | 14% |
| Option D: | 16.3% |
| | |
| 10. | Which one of the following does not fall under qualitative methods of forecasting? |
| Option A: | Judgmental methods |
| Option B: | Moving average methods |
| Option C: | Market research |
| Option D: | Delphi method |
| | |
| 11. | The length of time between placing an order and receipt of items is |
| Option A: | Demand |
| Option B: | Order cycle |
| Option C: | Re-order level |
| Option D: | Lead time |
| | |

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| 12. | The critical path |
| Option A: | is a path that operates from the starting node to the end node |
| Option B: | is a average of all paths |
| Option C: | is the longest path |
| Option D: | is the shortest path |
| 13. | Which one of the following is the manufacturing strategy adopted for Umbrella manufacturing? |
| Option A: | Make to Order |
| Option B: | Make to Stock |
| Option C: | Assemble to order |
| Option D: | Engineer to order |
| 14. | In PERT, if the pessimistic time were 14 weeks, the optimistic time were 8 weeks, and the most likely time were 11 weeks, |
| Option A: | the variance would be 1 week. |
| Option B: | the variance would be 11 weeks. |
| Option C: | the expected time would be 5.5 weeks. |
| Option D: | there is not enough information. |
| 15. | Which of the following is most appropriate statement for forecasting? |
| Option A: | Qualitative forecasting is the most accurate. |
| Option B: | Quantitative forecasting is most accurate. |
| Option C: | Forecasting always has some errors. |
| Option D: | Prediction |
| 16. | Following is one of the replenishment system in inventory control |
| Option A: | P system |
| Option B: | R system |
| Option C: | L system |
| Option D: | T system |
| 17. | In PERT, slack time equals |
| Option A: | EST + t |
| Option B: | LST - EST |
| Option C: | zero |
| Option D: | EFT - EST. |
| 18. | Decisions relating to production scheduling involve: |
| Option A: | Short-term forecasts |
| Option B: | Medium-term forecasts |
| Option C: | Long-term forecasts |
| Option D: | Short-term, medium-term and long-term forecasts |
| 19. | Sequencing |
| Option A: | assigns dates to specific jobs |
| Option B: | assigns jobs to work centres |

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| Option C: | specifies the order in which jobs should be done at each centre |
| Option D: | assigns workers to jobs |
| 20. | The heart of any ERP system is |
| Option A: | Information |
| Option B: | Database |
| Option C: | Customers |
| Option D: | Employees |

| Q2 (20 Marks) | Solve any Four out of Six (5 marks each) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------|---|----------------------|------------------|------------------|------------------|-----|----|----|-------------------------------|-----|----|----|----|-----|-----|---|---|-----|---|---|---|-----|---|---|---|-----|---|---|---|-----|---|---|---|-----|---|---|---|-----|---|---|---|-----|---|---|---|------|---|---|---|------|---|---|---|
| A | What are the information required to develop process planning? | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | <p>A washing machine manufacturing company establishes a fact that there is a relationship between the sale of washing machines and the population of the city. The market research carried out reveals the following information. Fit linear equation and estimate the demand for 45 million population.</p> <table border="1"> <thead> <tr> <th>Population (million)</th> <th>5</th> <th>7</th> <th>15</th> <th>22</th> <th>27</th> <th>36</th> </tr> </thead> <tbody> <tr> <td>Washing machine demand ('000)</td> <td>28</td> <td>40</td> <td>65</td> <td>80</td> <td>96</td> <td>130</td> </tr> </tbody> </table> | Population (million) | 5 | 7 | 15 | 22 | 27 | 36 | Washing machine demand ('000) | 28 | 40 | 65 | 80 | 96 | 130 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Population (million) | 5 | 7 | 15 | 22 | 27 | 36 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Washing machine demand ('000) | 28 | 40 | 65 | 80 | 96 | 130 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C | Explain the different stages in the evolution of ERP system. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D | Describe the Functions of Production Planning and Control. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E | <p>A project has the following characteristics</p> <table border="1"> <thead> <tr> <th>Activity</th> <th>Optimistic time</th> <th>Pessimistic time</th> <th>Most likely time</th> </tr> </thead> <tbody> <tr><td>1-2</td><td>1</td><td>5</td><td>1.5</td></tr> <tr><td>2-3</td><td>1</td><td>3</td><td>2</td></tr> <tr><td>2-4</td><td>1</td><td>5</td><td>3</td></tr> <tr><td>3-5</td><td>3</td><td>5</td><td>4</td></tr> <tr><td>4-5</td><td>2</td><td>4</td><td>3</td></tr> <tr><td>4-6</td><td>3</td><td>7</td><td>5</td></tr> <tr><td>5-7</td><td>4</td><td>6</td><td>5</td></tr> <tr><td>6-7</td><td>6</td><td>8</td><td>7</td></tr> <tr><td>7-8</td><td>2</td><td>6</td><td>4</td></tr> <tr><td>7-9</td><td>5</td><td>8</td><td>6</td></tr> <tr><td>8-10</td><td>1</td><td>3</td><td>2</td></tr> <tr><td>9-10</td><td>3</td><td>7</td><td>5</td></tr> </tbody> </table> <p>Construct network diagram. Find critical path and variance of each event.</p> | Activity | Optimistic time | Pessimistic time | Most likely time | 1-2 | 1 | 5 | 1.5 | 2-3 | 1 | 3 | 2 | 2-4 | 1 | 5 | 3 | 3-5 | 3 | 5 | 4 | 4-5 | 2 | 4 | 3 | 4-6 | 3 | 7 | 5 | 5-7 | 4 | 6 | 5 | 6-7 | 6 | 8 | 7 | 7-8 | 2 | 6 | 4 | 7-9 | 5 | 8 | 6 | 8-10 | 1 | 3 | 2 | 9-10 | 3 | 7 | 5 |
| Activity | Optimistic time | Pessimistic time | Most likely time | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-2 | 1 | 5 | 1.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-3 | 1 | 3 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-4 | 1 | 5 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-5 | 3 | 5 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-5 | 2 | 4 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-6 | 3 | 7 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-7 | 4 | 6 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-7 | 6 | 8 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7-8 | 2 | 6 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7-9 | 5 | 8 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-10 | 1 | 3 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9-10 | 3 | 7 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | Derive the equation of EOQ for basic inventory model. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Q3 (20 Marks) | Solve any Four out of Six (5 marks each) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------|---|-----------------------|------|-----|------|-----|------|-----|-----|-----|-----|------|---------------|-----------------------|---|----|---|---|----|---|---|----|---|---|----|-----|---|----|---|---|----|---|---|----|---|---|----|
| A | Classify the following items into ABC and draw the ABC curve. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Item No. | 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Annual Consumption | 300 | 2800 | 30 | 1100 | 40 | 2200 | 150 | 800 | 600 | 80 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Unit price (Rs) | 10 | 15 | 10 | 5 | 5 | 10 | 5 | 5 | 15 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | Differentiate between PERT and CPM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C | Explain manufacturing methods with suitable examples. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D | It is required to make 144 units of products in 4hrs shift. Each tasks, their time and predecessor are shown below. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1" data-bbox="614 752 1278 1133"> <thead> <tr> <th>Task</th> <th>Task time (s)</th> <th>Immediate predecessor</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>90</td> <td>-</td> </tr> <tr> <td>B</td> <td>30</td> <td>-</td> </tr> <tr> <td>C</td> <td>70</td> <td>A</td> </tr> <tr> <td>D</td> <td>10</td> <td>A,B</td> </tr> <tr> <td>E</td> <td>30</td> <td>D</td> </tr> <tr> <td>F</td> <td>60</td> <td>C</td> </tr> <tr> <td>G</td> <td>50</td> <td>C</td> </tr> <tr> <td>H</td> <td>50</td> <td>E,F,G</td> </tr> </tbody> </table> <p data-bbox="456 1137 1437 1256">Construct precedence diagram. Determine minimum number of work-stations, allocate the tasks in the stations according to Largest candidate rule.</p> | | | | | | | | | | | Task | Task time (s) | Immediate predecessor | A | 90 | - | B | 30 | - | C | 70 | A | D | 10 | A,B | E | 30 | D | F | 60 | C | G | 50 | C | H | 50 |
| Task | Task time (s) | Immediate predecessor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | 90 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | 30 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C | 70 | A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D | 10 | A,B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E | 30 | D | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | 60 | C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| G | 50 | C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H | 50 | E,F,G | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E | What are the objectives of MRP system? | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | Describe three qualitative forecasting methods with suitable examples | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

University of Mumbai

Examination 2020 under cluster 9 (FAMT)

Examinations Commencing from 7th January 2021 to 20th January 2021

Program: BE – MECHANICAL ENGINEERING

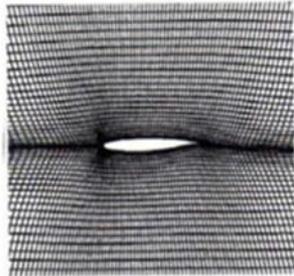
Curriculum Scheme: Rev 2016

Examination: BE Semester VII

Course Code: MEDLO7034 and Course Name: COMPUTATIONAL FLUID DYNAMICS

Time: 2 hour

Max. Marks: 80

| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
|-----------|---|
| 1. | How many additional terms are present in the x-momentum equation of Reynolds-Averaged Navier-Stokes equations? |
| Option A: | Zero |
| Option B: | Six |
| Option C: | Three |
| Option D: | Two |
| 2. |  Identify the type of Grid |
| Option A: | C type |
| Option B: | H type |
| Option C: | O type |
| Option D: | X type |
| 3. | Which of the following represent the rate of change of a variable due to diffusion within the control volume? |
| Option A: | $\text{grad}(\rho\Phi V)$ |
| Option B: | $\partial(\rho\Phi)/\partial t$ |
| Option C: | $\text{div}(\Gamma \text{grad} \Phi)$ |
| Option D: | $\text{grad}(\Gamma \text{div} \Phi)$ |
| 4. | The main difference between the SIMPLE and the SIMPLER algorithms is that in the latter |
| Option A: | No velocity-correction equation is used |
| Option B: | No relaxation factor is required |
| Option C: | Pressure is directly calculated |
| Option D: | No pressure-correction equation is used |
| 5. | The j^{th} unknown variable using TDMA is given by $\Phi_j = A_j \Phi_{j+1} + C_j$. (where $j=1$ to n are the nodes excluding boundaries). In which order A_j and C_j are computed? |

| | |
|-----------|--|
| Option A: | Backwards |
| Option B: | Forward |
| Option C: | Simultaneously |
| Option D: | Alternately |
| 6. | Which of the following is not true? |
| Option A: | There will still be a need of theoretical and experimental investigations in fluid flow problems in future |
| Option B: | Numerical results complement results from theoretical and experimental analyses |
| Option C: | Not all fluid flow problems can be solved using CFD even if very powerful computing resources are made available |
| Option D: | CFD has a potential to replace the theoretical and experimental approaches completely |
| 7. | The viscous stress on an elemental control volume in a Newtonian fluid flow in the y direction and on a plane perpendicular to the x direction is |
| Option A: | $\tau_{yx} = 2\mu \left(\frac{\partial v}{\partial y} \right) + \lambda(\nabla \cdot V)$ |
| Option B: | $\tau_{xy} = \mu \left(\frac{\partial u}{\partial y} + \frac{\partial v}{\partial x} \right)$ |
| Option C: | $\tau_{xy} = 2\mu \left(\frac{\partial u}{\partial y} + \frac{\partial v}{\partial x} \right)$ |
| Option D: | $\tau_{yx} = \mu \left(\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} \right)$ |
| 8. | In one-dimensional steady-state diffusion problem, which of the following is true? |
| Option A: | The diffusive flux of Φ leaving the east face is the same as the diffusive flux of Φ entering the west face |
| Option B: | The diffusive flux of Φ leaving the east face plus the diffusive flux of Φ entering the west face is equal to the generation of Φ |
| Option C: | The diffusive flux of Φ leaving the east face minus the diffusive flux of Φ entering the west face is equal to the generation of Φ |
| Option D: | The diffusive flux of Φ leaving the east face is the same in magnitude and opposite in direction as the diffusive flux of Φ entering the west face |
| 9. | For the control volume around node 'P' as shown in the figure, the diffusion coefficient Γ at the east face with linear approximation is |
| | |
| Option A: | $\Gamma_w = (\Gamma_P + \Gamma_W) / 2$ |
| Option B: | $\Gamma_w = (\Gamma_P - \Gamma_W) / 2$ |

| | |
|-----------|--|
| Option C: | $\Gamma_e = (\Gamma_E + \Gamma_P) / 2$ |
| Option D: | $\Gamma_e = (\Gamma_E - \Gamma_P) / 2$ |
| | |
| 10. | Thomas algorithm is a _____ |
| Option A: | Linear equations solver |
| Option B: | Quadratic equations solver |
| Option C: | Discretization method |
| Option D: | Linear least square system |
| | |
| 11. | If in a one dimensional diffusion problem $S_u = S_p = 0$ in a discretized equation $a_P \Phi_P = a_W \Phi_W + a_E \Phi_E + S_u$ at node, it implies that |
| Option A: | S_u and S_p are zero everywhere |
| Option B: | The discretized equation is for a node close to the left boundary |
| Option C: | The discretized equation is for a node close to the right boundary |
| Option D: | The discretized equation is for an internal node, which is neither close to the left nor to the right boundary |
| | |
| 12. | In a control volume adjacent to the boundary, the flux crossing the boundary is _____ in the discretized equation. |
| Option A: | set to some arbitrary constant |
| Option B: | set to zero |
| Option C: | introduced as a source term |
| Option D: | introduced as a convective flux |
| | |
| 13. | The substantial derivative $\frac{Du}{Dt}$ is |
| Option A: | $\frac{\partial \rho}{\partial x} + u \left(\frac{\partial \rho}{\partial x} \right) + v \left(\frac{\partial \rho}{\partial x} \right) + w \left(\frac{\partial \rho}{\partial x} \right)$ |
| Option B: | $\frac{\partial u}{\partial t} + u \left(\frac{\partial u}{\partial x} \right) + v \left(\frac{\partial v}{\partial y} \right) + w \left(\frac{\partial w}{\partial z} \right)$ |
| Option C: | $\frac{\partial u}{\partial t} + u \left(\frac{\partial u}{\partial x} \right) + v \left(\frac{\partial u}{\partial y} \right) + w \left(\frac{\partial u}{\partial z} \right)$ |
| Option D: | $\frac{\partial u}{\partial t} + u \left(\frac{\partial \rho}{\partial x} \right) + v \left(\frac{\partial \rho}{\partial y} \right) + w \left(\frac{\partial \rho}{\partial z} \right)$ |
| | |
| 14. | In vorticity transport equation for a two dimensional flow, the advection of the vorticity is given by the term: |
| Option A: | $u(\partial \omega_x / \partial x) + w(\partial \omega_z / \partial z)$ |
| Option B: | $v(\partial \omega_y / \partial y) + w(\partial \omega_z / \partial z)$ |
| Option C: | $u(\partial \omega_z / \partial x) + v(\partial \omega_z / \partial y)$ |
| Option D: | $u(\partial \omega_z / \partial y) + v(\partial \omega_z / \partial x)$ |
| | |
| 15. | Which feature of the coefficient matrix is a desirable for boundedness. |
| Option A: | Non-diagonal dominance |
| Option B: | Singularity |
| Option C: | Sparsity |
| Option D: | Diagonal dominance |
| | |

| | |
|-----------|---|
| 16. | Explicit scheme can be stable for a one dimensional diffusion problem if: |
| Option A: | $\Delta t < \rho C [(\Delta x)^2 / 2k]$ |
| Option B: | $\Delta t < \rho C [2k / (\Delta x)^2]$ |
| Option C: | $\Delta t < \rho C [(\Delta x)^2 / k]$ |
| Option D: | $\Delta t < \rho C [2k / (\Delta x)]$ |
| 17. | If turbulence is considered as the mechanism to dissipate energy, which of the following terms is particularly important in the Navier-Stokes equations? |
| Option A: | Diffusion term |
| Option B: | Convection term |
| Option C: | Rate of change term |
| Option D: | Source term |
| 18. | How many initial conditions and boundary conditions are needed for solving following equation. $\frac{d\phi}{dt} + u \frac{\partial \phi}{\partial x} + v \frac{\partial \phi}{\partial y} + w \frac{\partial \phi}{\partial z} = \alpha \left(\frac{\partial^2 \phi}{\partial x^2} + \frac{\partial^2 \phi}{\partial y^2} + \frac{\partial^2 \phi}{\partial z^2} \right) + \frac{q'''}{\rho C_p}$ |
| Option A: | One initial condition and three boundary conditions |
| Option B: | One initial condition and six boundary conditions |
| Option C: | three initial condition and three boundary conditions |
| Option D: | Three initial condition and six boundary conditions |
| 19. | <div style="display: flex; justify-content: space-between;"> <div style="width: 60%;"> </div> <div style="width: 35%;"> <p>For the two dimensional source free heat conduction problem shown in the figure, the discretized equation is given by</p> $a_p T_p = a_w T_w + a_e T_e + a_s T_s + a_n T_n + S_u.$ <p>Following is true for the coefficients of node-1:</p> </div> </div> |
| Option A: | a_s, S_u and S_p are zero. |
| Option B: | a_e, a_n and S_p are zero |
| Option C: | a_e, a_s and S_p are zero |
| Option D: | a_w, a_s and S_p are zero |

| | |
|-----------|---|
| 20. | One of the drawbacks of the non-conservative schemes is that they are likely to produce _____ |
| Option A: | large round off errors |
| Option B: | false diffusion |
| Option C: | large discretization errors |
| Option D: | artificial sources or sinks |

| | |
|------------|---|
| Q.2 | Solve Any Two (10 Marks each) |
| A | Derive the continuity equation in three dimensional Cartesian co-ordinates and also write the final result in the vector (conservative) form. |
| B | Write a short note on characteristics of turbulent flows and RANS equations. What are Reynolds stresses? |
| C | Explain steps involved in the SIMPLE algorithm. What is the difference between the algorithm used in SIMPLE and SIMPLER? |

| | |
|------------|--|
| Q.3 | Solve Any Two (10 Marks each) |
| A | <p>Consider a large plate of thickness $t = 5$ cm with an internal heat generation of 500 kW/m^3 and thermal conductivity of 0.5 W/mK. The east and west faces of the plate are maintained at 150 deg. C and 300 deg. C respectively. Assume that the dimensions in the directions perpendicular to the thickness are large enough such that the temperature gradients due to conduction are significant in the direction of thickness only.</p> <p>a) Write the (one dimensional) governing equation for the above phenomena b) Divide the thickness into five equal parts and obtain the discretized equation for each node. c) Arrange the equations in the form of a tri-diagonal Matrix.</p> |
| B | <p>What is TDMA? Solve following system of linear algebraic equations using TDMA:</p> $75\phi_1 = 25\phi_2 + 8500$ $50\phi_2 = 25\phi_1 + 25\phi_3 + 1000$ $50\phi_3 = 25\phi_2 + 25\phi_4 + 1000$ $50\phi_4 = 25\phi_3 + 25\phi_5 + 1000$ $75\phi_5 = 25\phi_4 + 16000$ |
| C | <p>A property ϕ is transported by means of convection and diffusion in a one dimensional domain. The governing equation to be used is $d/dx (\rho u \phi) = d/dx (\Gamma d\phi / dx)$. The boundary conditions are at $x = 0, \phi = 1$ and at $x = L, \phi = 0$. Assume that the property is transported from $x= 0$ to $x = L$. Using five equally spaced nodes and an upwind differencing scheme, frame the distribution of ϕ as a function of x for $u = 2.5 \text{ m/s}$, $L = 0.5 \text{ m}$, $\rho = 1.0 \text{ kg/m}^3$, $\Gamma = 0.1 \text{ kg/m-s}$. Obtain the discretized equations for the nodes and arrange them in the tri-diagonal Matrix form. Justify use of upwind differencing scheme in this case.</p> |

University of Mumbai
Examination 2020 under cluster 9 (FAMT)

Examinations Commencing from 7th January 2021 to 20th January 2021

Program: Mechanical Engineering

Curriculum Scheme: Rev2016

Examination: BE Semester VII

Course Code: MEDLO7031 and Course Name: Mechanical Vibration

Time: 2 hour

Max. Marks: 80

| | |
|------------|--|
| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
| 1. | _____ method is not based on energies. |
| Option A: | Energy |
| Option B: | Lagrange |
| Option C: | Rayleigh |
| Option D: | Newton |
| 2. | The mass moment of inertia of a disc, with radius R and mass M , about the axis of rotation passing through its center is _____. |
| Option A: | $M R R$ |
| Option B: | $2 M R R$ |
| Option C: | $0.5 M R R$ |
| Option D: | $0.5 M R$ |
| 3. | A solid wooden cylinder of cross sectional area A and height h is partially immersed in a bath of water of density ρ . The cylinder is depressed slightly and released. The square of the natural frequency of oscillation of the cylinder if it stays upright all the time is _____. |
| Option A: | $mg/Aphh$ |
| Option B: | g/h |
| Option C: | $2g/h$ |
| Option D: | $A\rho g/m$ |
| 4. | Flexibility and stiffness matrices have _____ relation. |
| Option A: | Direct |
| Option B: | No |
| Option C: | Direct exponential |
| Option D: | Inverse |
| 5. | At _____ point, the deflection is maximum. |
| Option A: | Node |
| Option B: | Anti-node |
| Option C: | Saddle |
| Option D: | Triple |
| 6. | _____ coordinates give equations of motion that are uncoupled both statically and dynamically. |

| | |
|-----------|---|
| Option A: | Dependent |
| Option B: | System |
| Option C: | Principal |
| Option D: | No |
| | |
| 7. | If two equations of motion contain second derivatives of both displacement variables, it is called as _____. |
| Option A: | Nothing as such |
| Option B: | Elastic or static coupling |
| Option C: | Damping or velocity coupling |
| Option D: | Dynamic or inertia coupling |
| | |
| 8. | In the case of overdamped response, the roots of the characteristic equation are _____. |
| Option A: | Real and distinct |
| Option B: | Equal |
| Option C: | Imaginary |
| Option D: | Zero |
| | |
| 9. | In the case of viscous damping, the reduction in the consecutive amplitudes is _____. |
| Option A: | Linear |
| Option B: | Exponential |
| Option C: | Quadratic |
| Option D: | Cubic |
| | |
| 10. | The equation of motion depicting forced vibration with viscous damping is a _____, _____ equation. |
| Option A: | Linear, Homogeneous |
| Option B: | Linear, Non-homogeneous |
| Option C: | Nonlinear, Homogeneous |
| Option D: | Nonlinear, Non-homogeneous |
| | |
| 11. | In the case of forced vibration, the phase angle between the spring force and damping force is _____. |
| Option A: | π |
| Option B: | $\pi/2$ |
| Option C: | 2π |
| Option D: | 0 |
| | |
| 12. | The springs of an automobile trailer are compressed 0.1 m under its own weight. The trailer is travelling over a road with a profile approximated by a sine wave of amplitude 0.08 m and wavelength 14 m. Assuming no damping present in the system, the amplitude of vibration of the trailer at 60 km/h is _____. |
| Option A: | 0.086 m |
| Option B: | 0.186 m |
| Option C: | 1.186 m |
| Option D: | 0 |
| | |

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| 13. | An accelerometer works well when the frequency ratio is _____. |
| Option A: | Very high |
| Option B: | Very small |
| Option C: | 1 |
| Option D: | 0 |
| 14. | In the case of _____ tachometer, multiple reeds of same length with different masses are used to find the natural frequency of a vibrating body. |
| Option A: | Frahm |
| Option B: | Fullarton |
| Option C: | Newton |
| Option D: | Multi-reed |
| 15. | _____ maintenance does not support a safe environment. |
| Option A: | Predictive |
| Option B: | Preventive |
| Option C: | Breakdown |
| Option D: | Condition monitoring |
| 16. | The time waveforms obtained from two transducers whose outputs are shifted by 90° in phase give _____. |
| Option A: | Phase plot |
| Option B: | Power spectrum |
| Option C: | Frequency spectrum |
| Option D: | Orbits |
| 17. | The principle of linear superposition cannot be used to analyze _____ system subjected to multi-frequency excitation. |
| Option A: | Linear |
| Option B: | Any |
| Option C: | Linear-homogeneous |
| Option D: | Nonlinear |
| 18. | _____ equation is a model of a structural system which includes nonlinear restoring forces. |
| Option A: | Newton |
| Option B: | Maxwell |
| Option C: | Duffing |
| Option D: | Lagrange |
| 19. | In the case where all the neighboring trajectories approach the limit cycle as time approaches infinity, it is called _____ limit cycle. |
| Option A: | Unstable |
| Option B: | Semi-stable |
| Option C: | Stable |
| Option D: | Infinite |
| 20. | If eigenvalues of a second-order viscously damped system have both real and imaginary components, its phase portrait will have _____ shape. |

| | |
|-----------|------------|
| Option A: | Elliptical |
| Option B: | Parabolic |
| Option C: | Spiral |
| Option D: | Hyperbolic |

| | |
|------------|--|
| Q2. | Solve any Two Questions out of Three (10 marks each) |
| A | An exhaust fan rotating at 1000 rpm, is to be supported by four springs, each having a stiffness of K . If only 10 percent of the unbalanced force of the fan is to be transmitted to the base, what should be the value of K ? Assume the mass of the exhaust fan to be 40 Kg. |
| B | Derive differential equations of motion for a double pendulum (with string lengths l_1 and l_2 ; masses m_1 and m_2) using the coordinates θ_1 and θ_2 , assuming small amplitudes. Write the equations in the matrix form. |
| C | In a single degree of freedom spring-mass-damper system, mass = 20 Kg, Spring stiffness = 10 N/mm, and Damping = 0.15 N/mm/s. If the system is initially at rest and a velocity of 100 mm/s is imparted to the mass, then determine (i) displacement and velocity of mass as a function of time, and (ii) displacement and velocity at time equal to one second. |

| | |
|------------|--|
| Q3. | Solve any Two Questions out of Three (10 marks each) |
| A | A vehicle of mass 1,200 kg is travelling on a road, the surface of which varies sinusoidally with an amplitude of 0.05 m and wave length of 6 m. The suspension system has a spring constant of 400 kN/m and a damping ratio of 0.50. If the vehicle speed is 100 km/h, find the amplitude of the vehicle. |
| B | Explain how a simple seismic pick-up can measure the amplitude of motion or the acceleration of a vibrating body depending upon the ratio of its natural frequency to the frequency of the vibrating body. |
| C | Explain various sources of nonlinearity in vibration; and differentiate between linear and nonlinear vibration. |

University of Mumbai

Examination 2020 under cluster 9 (FAMT, Ratnagiri)

Examinations Commencing from 7th January 2021 to 20th January 2021

Program: **B.E Mechanical**

Curriculum Scheme: Rev 2016

Examination: BE Semester VII

Course Code: MEDLO7032 and Course Name: Automobile Engineering

Time: 2 hour

Max. Marks: 80

| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
|------------|---|
| 1. | A Single plate clutch has ____. |
| Option A: | A driven plate which has one driving surface. |
| Option B: | A driven plate which has two driving surface. |
| Option C: | The main thrust springs plate between the plate and cover. |
| Option D: | Friction facing riveted to the pressure plates. |
| 2. | Which aspect is not correct in the context of wet clutch when compared with dry clutch? |
| Option A: | Greater torque capacity |
| Option B: | Can tolerate long engagement time. |
| Option C: | Long life |
| Option D: | Clutch plate wetter by oil circulation. |
| 3. | A freewheel_____ i. is always in action during the motion of the wheel. ii. gets automatically locked. iii. is mounted just after gearbox iv. involves a cam and spring loaded balls in its construction. |
| Option A: | ii & iii |
| Option B: | i & iii |
| Option C: | ii,iii & iv |
| Option D: | i,iii & iv |
| 4. | In the coupling stage of conventional torque converter _____. |
| Option A: | Both the stator and turbine are stationary. |
| Option B: | Both stator and impeller are stationary. |
| Option C: | The stator free wheels. |
| Option D: | Both the impeller and turbine turn almost at same speed. |
| 5. | The full floating axle has to withstand the following loads : i. driving torque ii. Weight of vehicle. iii. end thrust |
| Option A: | Only i |
| Option B: | i & iii |
| Option C: | ii & iii |
| Option D: | i , ii & iii |

| | |
|-----------|---|
| | |
| 6. | Identify the smallest gear inside the differential casing. |
| Option A: | Sun gear |
| Option B: | Pinion gear |
| Option C: | Side gear |
| Option D: | ring gear |
| | |
| 7. | The center part of typical universal joint is called as _____. |
| Option A: | Shear pin |
| Option B: | Fork |
| Option C: | Spider |
| Option D: | Trunnion |
| | |
| 8. | The function of propeller shaft is to _____. |
| Option A: | Allows sharp turn to be taken smoothly |
| Option B: | Connect the engine to drive wheels |
| Option C: | Assist in final gear reduction |
| Option D: | Transmit power from gearbox to differential |
| | |
| 9. | The term castor is associated with _____. |
| Option A: | steering system |
| Option B: | Braking system |
| Option C: | transmission system |
| Option D: | Suspension system |
| | |
| 10. | On cars having rack and pinion gear, the rack is attached to _____. |
| Option A: | Relay rod |
| Option B: | Tie rod |
| Option C: | Track rod |
| Option D: | Drag link |
| | |
| 11. | The brake fade applied to braking system means _____. |
| Option A: | Fall in efficiency due to heat |
| Option B: | Discolorisation of oil soaked lining |
| Option C: | Excessive wear causing decrease in friction |
| Option D: | Requirement of greater effort due to increased shoe clearance. |
| | |
| 12. | All the followings are true about radial tires except. |
| Option A: | All plies run parallel to each other. |
| Option B: | All plies are vertical to tyre bead. |
| Option C: | Greater rolling resistance compared to bias ply tyre. |
| Option D: | A circumferential belt is applied over the plies. |
| | |
| 13. | Consider the following statements with respect to wheel imbalance. i. bounces vertically or deflects side to side ii. causes steering wheel vibration and uneven tyre wear. iii. can be adjusted by tyre rotation. |
| Option A: | i , ii & iii |
| Option B: | i & ii |
| Option C: | ii & iii |

| | |
|-----------|--|
| Option D: | i & iii |
| 14. | The liners of zinc or any other soft material are occasionally inserted between the blades of leaf springs to _____. |
| Option A: | Improves fatigue life |
| Option B: | Provide damping |
| Option C: | Decrease vibration |
| Option D: | Prevents squeaking sound |
| 15. | Which is not true in the context of coil springs used mainly with independent suspension system? |
| Option A: | Capability to take torque reaction and side front. |
| Option B: | Can store more energy per unit volume. |
| Option C: | No static friction and noise problem. |
| Option D: | Can be well accommodated in restricted space. |
| 16. | The stationary magnetic field in the starting motor is produced by _____. |
| Option A: | Relay or solenoid |
| Option B: | Field windings of permanent magnets |
| Option C: | Brushes or Commutator |
| Option D: | Armature windings |
| 17. | The purpose of dynamo is to _____. |
| Option A: | Convert the mechanical energy into electric energy. |
| Option B: | Act as reservoir of electric energy |
| Option C: | Supply the electric power |
| Option D: | Continually recharge the battery |
| 18. | Which aspect is not true in the context of frameless construction when compare to conventional framed construction? |
| Option A: | Passenger safety during accidents. |
| Option B: | Reduced weight |
| Option C: | Greater strength and durability |
| Option D: | Increased stability |
| 19. | Which aspect is true in the context of profile drag? |
| Option A: | Sum of skin friction and pressure drags. |
| Option B: | Drag due to shape and form of the body. |
| Option C: | Drag produced by end effects due to finite length of an object. |
| Option D: | Results from occurrences of wake. |
| 20. | Following type of sensors are used to generate information in object grasping and obstacle avoidance. |
| Option A: | Hall Effect sensor |
| Option B: | Proximity sensor |
| Option C: | Light sensor |
| Option D: | Optical sensors |

| | |
|------------|---|
| Q2. | Attempt the following |
| A | Solve any Two. 5 marks each |
| i. | Explain overdrive with neat sketch. |
| ii. | Explain various battery ratings. |
| iii. | Explain bendix drive. |
| B | Solve any One 10 marks each |
| i. | Explain various types of automobile chassis with neat sketch. |
| ii. | Explain the difference between sprung and un-sprung mass. |

| | |
|------------|--|
| Q3. | Attempt the following |
| A | Solve any Two. 5 marks each |
| i. | Explain electronic brake distribution. |
| ii. | Explain under-steer and over-steer phenomenon. |
| iii. | Write a short note on automobile differential. |
| B | Solve any One 10 marks each |
| i. | Explain different types of final drive with neat sketch. |
| ii. | Explain working of synchromesh gearbox in detail with neat sketch. |

University of Mumbai
Examination 2020 under cluster 9 (FAMT Ratnagiri)
Examinations Commencing from 7th January 2021 to 20th January 2021

Program: Mechanical Engineering

Curriculum Scheme: Rev2016

Examination: BE Semester VII

Course Code: MEDLO7033 and Course Name: PUMPS COMPRESSORS AND FANS

Time: 2 hour

Max. Marks: 80

| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
|-----------|---|
| 1. | According to Euler's equation in relation to hydraulic machines, the rate of energy transfer by the fluid to the rotor can be expressed in terms of the head as: (here, V_w is the whirl component of velocity of the fluid and U is the linear velocity of the rotor. Subscripts 1 and 2 represent inlet and outlet of the rotor respectively) |
| Option A: | $H = V_{w1}U_1 - V_{w2}U_2$ |
| Option B: | $H = V_{r1}U_1 - V_{r2}U_2$ |
| Option C: | $H = V_1U_1 - V_2U_2$ |
| Option D: | $H = V_{w1}V_1 - V_{w2}V_2$ |
| 2. | Dimesnionless parameter (Q / ND^3) is called as |
| Option A: | Head coefficient |
| Option B: | Capacity coefficient |
| Option C: | Reynolds number |
| Option D: | Power coefficient |
| 3. | Negative slip in reciprocating pump occurs when... |
| Option A: | Actual discharge is more than theoretical discharge |
| Option B: | Delivery pipe is long |
| Option C: | Suction pipe is short |
| Option D: | Pump is running at slow speed |
| 4. | An operation in which liquid is completely filled in the chamber of pump so that air or gas or vapour from the portion of pump is driven out and no air pocket is left is called |
| Option A: | emptying |
| Option B: | blowing |
| Option C: | priming |
| Option D: | scavenging |
| 5. | Fans and blowers are turbo machines which deliver air at a |
| Option A: | at high velocity and low pressure |
| Option B: | at low velocity and low pressure |
| Option C: | at high velocity and high pressure |
| Option D: | at low velocity and high pressure |
| 6. | Impellers are useful in the pumping of liquids containing suspended solid matter, |

| | |
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| | such as paper pulp, sewage and water containing sand or grit. These impellers are |
| Option A: | Semi open impellers |
| Option B: | Closed impellers |
| Option C: | Open impellers |
| Option D: | Semi closed impellers |
| | |
| 7. | For best efficiency of the pump, it is commonly assumed that the liquid should enter the impeller..... |
| Option A: | Axially |
| Option B: | Radially |
| Option C: | tangentially |
| Option D: | at an angle 45 |
| | |
| 8. | Value of slip factor for 24 number of vanes |
| Option A: | 1.01 |
| Option B: | 0.99 |
| Option C: | 0.85 |
| Option D: | 0.91 |
| | |
| 9. | The main function of centrifugal pump is to |
| Option A: | Transfer Pressure |
| Option B: | Transfer Speed |
| Option C: | Transfer Temperature |
| Option D: | Transfer Energy |
| | |
| 10. | The device used to obtain a continuous supply of water at uniform rate, to save a considerable amount of work and to run the pump at a high speed without separation is called as.... |
| Option A: | Air vessel |
| Option B: | Suction valve |
| Option C: | Delivery valve |
| Option D: | foot valve |
| | |
| 11. | What is the specific ratio for a blower? |
| Option A: | <1.1 |
| Option B: | 1.11 to 1.2 |
| Option C: | >1.2 |
| Option D: | 1.11 |
| | |
| 12. | _____ can be defined as the ratio of the pressure rise in rotor blades to the pressure rise in stages in an axial flow compressor. |
| Option A: | Degree of pressure |
| Option B: | Reaction ratio |
| Option C: | pressure ratio |
| Option D: | Degree of reaction |
| | |
| 13. | In centrifugal compressors, working fluid i.e. air will enter to the compressor at the impeller eyeand will be released |
| Option A: | Axially, radially inward |

| | |
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| Option B: | tangentially, radially outward |
| Option C: | Axially, radially outward |
| Option D: | radially, radially outward. |
| | |
| 14. | Vaneless space in centrifugal compressor provided because |
| Option A: | Mach number of flow of air need to be increased. |
| Option B: | Mach number of flow of air need to be reduced. |
| Option C: | Mach number of flow of air should not be affected. |
| Option D: | Mach number of flow be 1.2. |
| | |
| 15. | Overall efficiency of a centrifugal pump is the ratio of |
| Option A: | Energy available at the impeller to the energy supplied to the pump by the prime mover |
| Option B: | Actual work done by the pump to the energy supplied to the pump by the prime mover |
| Option C: | Energy supplied to the pump to the energy available at the impeller |
| Option D: | Manometric head to the energy supplied by the impeller per Newton of water |
| | |
| 16. | The discharge through a single acting reciprocating pump is |
| Option A: | $Q = 2ALN/60$ |
| Option B: | $Q = ALN/60$ |
| Option C: | $Q = ALN$ |
| Option D: | $Q = 2NT/60$ |
| | |
| 17. | A fan produces 1000 m ³ /hour at an impeller speed of 2000 rpm. What is the resulting airflow if the speed was reduced to 1000 rpm? |
| Option A: | 250 m ³ /hour |
| Option B: | 500 m ³ /hour |
| Option C: | 650 m ³ /hour |
| Option D: | 150 m ³ /hour |
| | |
| 18. | In which of the following exhaust fan air flows radially (diverging from the center) |
| Option A: | Axial fan |
| Option B: | Tube axial fan |
| Option C: | Centrifugal fan |
| Option D: | Propeller fans |
| | |
| 19. | On pump head curve the maximum volume flow rate through a pump occurs when its net head is zero is called as _____ |
| Option A: | Pump free delivery |
| Option B: | Shut off head |
| Option C: | Best efficiency point |
| Option D: | Operating point |
| | |
| 20. | The metallic surfaces are damaged and cavities are formed on the surfaces. This is the effect of _____ |
| Option A: | Prewhirl |
| Option B: | Vapour pressure |
| Option C: | Discharge pressure |

| | |
|-----------|---------|
| Option D: | Priming |
|-----------|---------|

| | |
|-----------|--|
| Q2 | Solve any Four out of Six (5 marks each) |
| A | State and Define various dimensionless parameter used in fluid machines |
| B | A single acting reciprocating pump, running at 50 rpm delivers 0.00736 m ³ /s of water. The diameter of the piston is 200 mm and stroke length 300 mm. The suction and delivery heads are 3.5 m and 11.5 m respectively. Determine percentage slip of the pump and power required to run the pump. |
| C | Write a note pump in series and parallel. |
| D | Explain the term Stall, Surging and choking with respect to centrifugal compressor. |
| E | In one stage of an axial flow compressor, the pressure ratio is to be 1.22 and the air inlet stagnation temperature is 288K. If the stagnation temperature rise of the stages is 21K, the rotor tip speed is 200 m/s, and the rotor rotates at 4500 rpm, calculate the stage efficiency and diameter of the rotor. |
| F | Write a note on Classification of fan. |

| | |
|------------|--|
| Q3. | Solve any Two Questions out of Three (10 marks each) |
| A | <i>A single acting reciprocating pump has a piston diameter 150 mm and stroke length 350 mm. The centre of the pump is 3.5 m above the water surface in the sump and 22 m below the delivery water level. Both the suction and delivery pipes have the same diameter of 100 mm and are 5m and 30m long respectively. If the pump is working at 30 rpm. Determine</i> 1) <i>Pressure head on the piston at the beginning, middle and end of both suction and delivery strokes</i> 2) <i>The power required to drive the pump. Take atmospheric pressure as 10.3 m of water.</i> |
| B | <i>A centrifugal pump impeller having external and internal diameter 480 mm and 240 mm respectively is running at 100 rpm. The rate of flow through the pump is 0.576 m³/s and velocity of flow is constant and equal to 2.4 m/s. The diameters of the suction and delivery pipes are 180 mm and 120 mm respectively and suction and delivery heads are 6.2 m(abs) and 30.2 m of water respectively. If the power required to drive the pump is 23.3 kw and the outlet vane angle is 45°. Determine:</i> 1) <i>Inlet blade angle</i> 2) <i>The overall efficiency</i> 3) <i>The manometric efficiency of the pump.</i> |
| C | <i>An axial flow compressor has a tip diameter of 0.95 m and a hub diameter of 0.85 m. The absolute velocity of air makes an angle of 288° measured from the axial direction and relative velocity angle is 56.8°. The absolute velocity outlet angle is 56.8° and the relative velocity outlet angle is 28.8°. The rotor rotates at 5000 rpm and the density of air is 1.2 kg/m³. Determine:</i> 1. <i>The axial velocity.</i> 2. <i>The mass flow rate.</i> 3. <i>The power required.</i> 4. <i>The flow angles at the hub.</i> 5. <i>The degree of reaction at the hub.</i> |

University of Mumbai
Examination 2020 under cluster ALL (Lead College: VCET)

Examinations Commencing from 7th January 2021 to 20th January 2021

Program: ALL_Institute Level Optional Course 1

Curriculum Scheme: Rev2016

Examination: BE Semester VII

Course Code: ILO 7016 and Course Name: Cyber Security and Laws

Time: 2 hour

Max. Marks: 80

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| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
|------------|--|
| 1. | Which of the following are wireless attacks? |
| Option A: | MAC Spoofing , Phishing |
| Option B: | Eavesdropping,, MAC Spoofing |
| Option C: | Phishing, Repudiation |
| Option D: | Eavesdropping , Non- Repudiation |
| 2. | This attack can be deployed by infusing a malicious code in a website's comment section. |
| Option A: | Cross Site Request Forgery (XSRF) |
| Option B: | SQL injection |
| Option C: | HTML Scripting |
| Option D: | Cross Site Scripting (XSS) |
| 3. | The Objective of Firewalls is to protect? |
| Option A: | Data Driven Attacks |
| Option B: | Unauthorized Access |
| Option C: | Confidentiality |
| Option D: | Integrity |
| 4. | The user activities are sniff and forward this information as a background process to the attackers |
| Option A: | Adware |
| Option B: | Malware |
| Option C: | Spyware |
| Option D: | Warms |
| 5. | It is a class of computer threat? |
| Option A: | Stalking |
| Option B: | Phishing |

| | |
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| Option C: | DOS attacks |
| Option D: | Soliciting |
| | |
| 6. | Someone posing as IT tech requests information about your computer configuration. What kind of attack is this? |
| Option A: | Whaling |
| Option B: | Social Engineering |
| Option C: | Insider Threat |
| Option D: | Phishing |
| | |
| 7. | The Primary objective of worm is to Spread the infection from.... |
| Option A: | computer to computer |
| Option B: | File to file on a computer |
| Option C: | Website to website |
| Option D: | Router to routers |
| | |
| 8. | It is usually targeted by nature where the emails are exclusively designed to target any exact user. |
| Option A: | Algo-based phishing |
| Option B: | Vishing |
| Option C: | Domain Phishing |
| Option D: | Spear phishing |
| | |
| 9. | In this attack, someone is repeatedly harassed to individuals or organizations using any electronics means. |
| Option A: | Identity theft |
| Option B: | Phishing |
| Option C: | Cyber stalking |
| Option D: | Bullying |
| | |
| 10. | It is a kind of attempts by individuals to get confidential or sensitive information from a individuals to falsifying their identity? |
| Option A: | Identity theft scam |
| Option B: | Phishing scams |
| Option C: | Spyware scams |
| Option D: | Trojan horse Scam |
| | |

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| 11. | It cannot be exploited by assigning or by licensing the rights to others. |
| Option A: | Designs |
| Option B: | Patents |
| Option C: | Copy rights |
| Option D: | Trademark |
| | |
| 12. | Which of following would not gain copyright protection? |
| Option A: | A DVD |
| Option B: | An unrecorded speech |
| Option C: | Written lyrics of a song |
| Option D: | A hand knitted jumper |
| | |
| 13. | Which one of the following statements is true? |
| Option A: | The definition of an invention is set out in the Patents Act 1977. |
| Option B: | Copyright must be registered in order to gain protection. |
| Option C: | A patent must be registered in order to gain protection. |
| Option D: | The owner of a patent cannot sell it but can prevent others using his invention. |
| | |
| 14. | Which one of the following is outside the scope of IT Act 2000 |
| Option A: | Electronic message |
| Option B: | Electronic Evidence |
| Option C: | Power of Attorney with digital signature |
| Option D: | Electronic gift |
| | |
| 15. | Which Act casts responsibility on body corporate to protect sensitive personal information and provide punishment for offences by companies. |
| Option A: | IT Act 2000 |
| Option B: | Indian Evidence Act 1872 |
| Option C: | Indian penal code |
| Option D: | IT (Amendment)Act 2008 |
| | |
| 16. | What is the proposed punishment for Cyber Terrorism in IT Act? |
| Option A: | 10 year imprisonment |
| Option B: | Life Imprisonment |

| | |
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| Option C: | 5 year imprisonment |
| Option D: | 1 Lac rupees penalty |
| | |
| 17. | Which of the following NERC Standard provide cyber-security framework for identification and protection of critical cyber assets to support the reliable operation of BES |
| Option A: | CIP-001 |
| Option B: | CIP-002 |
| Option C: | CIP-002 through CIP-009 |
| Option D: | CIP-003 |
| | |
| 18. | Standard CIP-002 is used for |
| Option A: | Critical cyber asset identification |
| Option B: | Electronic Security Perimeter |
| Option C: | Physical Security of Critical cyber assets |
| Option D: | Sabotage reporting |
| | |
| 19. | Which of the following are part of key provisions of Sarbanes-Oxley Act ? |
| Option A: | Physical Security of Critical cyber assets |
| Option B: | Bulk Electric System (BES) |
| Option C: | Critical assets |
| Option D: | Corporate Responsibility for financial reports |
| | |
| 20. | ISO 27000 was originally published in ____ as the BS 7799 by the British Standards Institute (BSI) |
| Option A: | 1995 |
| Option B: | 1998 |
| Option C: | 2000 |
| Option D: | 2012 |

| | |
|---------------------------------|--|
| Q2 (20 Marks) | |
| A | Solve any Two 5 marks each |
| i. | Explain Active and Passive Attacks with example |
| ii. | Explain how Appeal can be made under the IT Act 2000 |
| iii. | Explain Key IT Requirement of GLBA/GLB |
| B | Solve any One 10 marks each |
| i. | How Criminal Plan the Attack? Explain various steps |

| | |
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| ii. | Explain E-Contracts. Discuss E-Contracts Act 1872. |
|-----|--|

| | |
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| Q3. (20 Marks) | |
| A | Solve any Two 5 marks each |
| i. | Explain Bluetooth Hacking with various tools |
| ii. | Explain Vishing, Phishing and Smishing in Cyber Security |
| iii. | Explain Key IT Requirement of FISMA |
| B | Solve any One 10 marks each |
| i. | Explain how Intellectual Property Laws protect the rights of the owner of the Intellectual Property |
| ii. | Explain Key features of Indian Information Technology Act 2000. |

University of Mumbai

Examination 2020 under cluster ALL (Lead College:)

Examinations Commencing from 7th January 2021 to 20th January 2021

Program: ALL_Institute Level Optional Course 1

Curriculum Scheme: Rev2016

Examination: BE Semester VII

Course Code: ILO 7018 and Course Name: EAM

Time: 2 hour

Max. Marks: 80

| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
|------------|---|
| 1. | Energy that is available in market for definite price is known as |
| Option A: | Renewable energy |
| Option B: | Commercial energy |
| Option C: | Non-commercial energy |
| Option D: | Traditional energy |
| 2. | As per the report "BP Statistical Review of World Energy-2014", for how many years the coal reserve in India available for energy production? |
| Option A: | 500 |
| Option B: | 300 |
| Option C: | 100 |
| Option D: | 200 |
| 3. | Which source of energy dominates the energy production mix in India? |
| Option A: | Natural gas |
| Option B: | Coal |
| Option C: | Oil |
| Option D: | Nuclear |
| 4. | Assisting and implementing ENCON recommendation measures and monitoring the performance are done in |
| Option A: | Pre Audit phase |
| Option B: | Audit phase |
| Option C: | Post Audit phase |
| Option D: | Pre and Audit phase |
| 5. | The height of a column in a pump is called as |
| Option A: | Horizontal head |
| Option B: | Static head |
| Option C: | Multi head |
| Option D: | Vertical head |
| 6. | What covers study of Variations occurring in energy costs, availability and reliability of supply of energy, energy mix, identify energy conservation technologies, retrofit for energy conservation equipment. |
| Option A: | Performance assessment |

| | |
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| Option B: | Energy Audit |
| Option C: | Energy reliability |
| Option D: | Energy planning |
| | |
| 7. | Which type of audit offers the most accurate estimate of energy savings and cost? |
| Option A: | Preliminary Audit |
| Option B: | Detailed Audit |
| Option C: | Overall Audit |
| Option D: | Secondary Audit |
| | |
| 8. | Obtaining site drawings like building layout, steam, air distribution, electricity distribution are performed in which phase of audit? |
| Option A: | Post Audit phase |
| Option B: | Pre Audit phase |
| Option C: | Audit phase |
| Option D: | In between Pre and Post Audit phase |
| | |
| 9. | Power factor can be improved by connecting which among these? |
| Option A: | Semiconductor device |
| Option B: | Resistors |
| Option C: | Inductor |
| Option D: | Static capacitors |
| | |
| 10. | Fixed charge and Variable charge are dependent on what factor for HT consumer? |
| Option A: | Average load ,Energy consumption |
| Option B: | Energy consumption, Maximum Demand |
| Option C: | Maximum demand, Energy Consumption |
| Option D: | Maximum demand ,Peak load demand |
| | |
| 11. | Energy savings potential of variable torque applications compared to constant torque application is: |
| Option A: | Higher |
| Option B: | Equal |
| Option C: | Lower |
| Option D: | Does not depend on Torque |
| | |
| 12. | Electronic soft starters are used for motors to: |
| Option A: | improve the loading |
| Option B: | provide smooth start and stop |
| Option C: | achieve variable speed |
| Option D: | provide jerk during starting |
| | |
| 13. | For large space lighting we prefer |
| Option A: | Time based control |
| Option B: | day light based controllers |
| Option C: | Localized Switching |
| Option D: | Photo sensors |
| | |
| 14. | Formation of bubbles in an impeller is called |
| Option A: | Cavitation |

| | |
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| Option B: | Defects |
| Option C: | Friction |
| Option D: | Heat burn |
| | |
| 15. | If no instrument other than tachometer is available, what method you would suggest for measuring the motor load? |
| Option A: | Slip method |
| Option B: | Input power measurement method |
| Option C: | Line current measurement method |
| Option D: | Terminal voltage method |
| | |
| 16. | In lighting performance assessment ILER stands for |
| Option A: | International Lighting Energy Regulation |
| Option B: | Indian Lighting Efficiency Regulation |
| Option C: | Installed Load Efficacy Ratio |
| Option D: | Interior Lighting Energy Ratio |
| | |
| 17. | To have lighting performance assessment satisfactory to good, ILER value must be |
| Option A: | 0.75 and above |
| Option B: | 0.5 and less |
| Option C: | between 0.25 to 0.5 |
| Option D: | below 0.25 |
| | |
| 18. | Which LEED rating system requires durability? |
| Option A: | LEED for Schools |
| Option B: | LEED for Commercial Interiors |
| Option C: | LEED for Homes |
| Option D: | LEED for Existing Buildings: Operation and Maintenance |
| | |
| 19. | Photovoltaic cell converts solar energy into |
| Option A: | Heat energy |
| Option B: | Electric energy |
| Option C: | Mechanical energy |
| Option D: | Chemical energy |
| | |
| 20. | Which insulation material is used for high temperatures |
| Option A: | Magnesia |
| Option B: | Polyurethane |
| Option C: | Expanded Polystyrene |
| Option D: | Calcium Silicate |

| | |
|-----------|--|
| Q2 | |
| A | Solve any Two 5 marks each |
| i. | Explain any FIVE special features of green building. |
| ii. | Explain advantages of power factor improvement. |
| iii. | A pump is filling water in to a rectangular overhead tank of 5 m x 4 m with a height of 8 m. The inlet pipe to the tank is located at height of 20 m above ground. Pump suction : 3 m below pump level Overhead tank overflow line : 7.5 m from the bottom of the tank Power drawn by motor : 5.5 kW Motor efficiency η : 92% Time taken by the pump to fill the overhead tank up to overflow level : 180 minutes. Find the pump efficiency. |
| B | Solve any One 10 marks each |
| i. | What is the need of energy audit and explain types of energy audit. |
| ii. | Describe General fuel economy measures in furnaces |

| | |
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| Q3 | |
| A | Solve any Two 5 marks each |
| i. | Explain Benchmarking and its types. |
| ii. | A 7.5 kW, 415 V, 15 A, 970 RPM, 3 phase rated induction motor with full load efficiency of 86 % draws 7.5 A and 3.23 kW of input power. Find the percentage loading of the motor. |
| iii. | Explain what is thermal insulations and its benefits. |
| B | Solve any One 10 marks each |
| i. | Describe energy saving opportunities in water pumps. |
| ii. | Explain energy conservation opportunities in lighting controls. |

University of Mumbai
Examination 2020 under cluster ALL(Lead College: VCET)

Examinations Commencing from 7th January 2021 to 20th January 2021

Program: ALL_Institute Level Optional Course 1

Curriculum Scheme: Rev2016

Examination: BE Semester VII

Course Code: ILO 7011 and Course Name: Product Life Cycle Management

Time: 2 hour

Max. Marks: 80

| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
|------------|--|
| 1. | _____ is not a phase under product life cycle management |
| Option A: | Introduction |
| Option B: | Growth |
| Option C: | Maturity |
| Option D: | Rotation |
| 2. | In _____ phase extensive advertisement is needed for product promotion |
| Option A: | Introduction |
| Option B: | Growth |
| Option C: | Maturity |
| Option D: | Decline |
| 3. | In _____ phase profit level reaches to its maximum peak |
| Option A: | Introduction |
| Option B: | Growth |
| Option C: | Maturity |
| Option D: | Decline |
| 4. | In _____ phase product sales reaches to minimum and profit is also lowest |
| Option A: | Introduction |
| Option B: | Growth |
| Option C: | Maturity |
| Option D: | Decline |
| 5. | _____ is not a benefit of PLM |
| Option A: | Product life cycle analysis |
| Option B: | Profit maximization |
| Option C: | Decision making |
| Option D: | Large investment |
| 6. | In _____ design model approach simultaneous and interlinked design activities are carried out |
| Option A: | Integrated |
| Option B: | Individual |
| Option C: | Isolated |
| Option D: | Dual |

| | |
|-----------|--|
| 7. | _____ engineering is also called as simultaneous engineering. |
| Option A: | Concurrent |
| Option B: | Combine |
| Option C: | Linear |
| Option D: | Parallel |
| 8. | _____ emphasizes the multidisciplinary approach in the product development process |
| Option A: | Concurrent engineering |
| Option B: | Dual engineering |
| Option C: | Rotational Engineering |
| Option D: | Realistic engineering |
| 9. | _____ is not a step under new product development. |
| Option A: | Idea generation |
| Option B: | Concept development |
| Option C: | Idea screening |
| Option D: | Sensitivity analysis |
| 10. | In ____ product is customized according to the customer wishes and product prepared as per specific requirement of customer. |
| Option A: | Product configuration |
| Option B: | Product rotation |
| Option C: | Product division |
| Option D: | Product linearization |
| 11. | PDM stands for _____ |
| Option A: | Product Data Management |
| Option B: | Product Development Management |
| Option C: | Product Dispatch Management |
| Option D: | Product Distinct Manament |
| 12. | _____ is not the benefit of PDM |
| Option A: | It centralizes and control data |
| Option B: | It removes unnecessary data |
| Option C: | It improves data management |
| Option D: | It increases cost and time |
| 13. | _____ is not the feature of PDM |
| Option A: | It facilitates better use of resources |
| Option B: | Engineering changes can be controlled easily |
| Option C: | Lead time gets reduced |
| Option D: | Consumes more time and resources |
| 14. | _____ is not the component of virtual product development |
| Option A: | Virtual product design |
| Option B: | Virtual simulation |
| Option C: | Digital manufacturing |
| Option D: | Supply chain management |

| | |
|-----------|--|
| 15. | DMU stands for _____ |
| Option A: | Digital Mock up Unit |
| Option B: | Digital Manufacturing Unit |
| Option C: | Digital Maintenance Unit |
| Option D: | Differential Manufacturing Unit |
| 16. | _____ is a realistic rendering technique of creating an image by tracing the path of light |
| Option A: | Ray tracing |
| Option B: | Ray casting |
| Option C: | Radiosity |
| Option D: | Radiography |
| 17. | DFE stands for _____ |
| Option A: | Design for excellence |
| Option B: | Design for efficiency |
| Option C: | Design for environment |
| Option D: | Design for economy |
| 18. | DFE focuses on _____ factor |
| Option A: | Economy |
| Option B: | Energy |
| Option C: | Efficiency |
| Option D: | Environment |
| 19. | LCA stands for _____ |
| Option A: | Life Cycle Assessment |
| Option B: | Life Cycle Analysis |
| Option C: | Life Cycle Assembly |
| Option D: | Life Cycle Achievement |
| 20. | LCCA stands for |
| Option A: | Life Cycle Class Achievement |
| Option B: | Life Cycle Creative Assessment |
| Option C: | Life Cycle Combine Assessment |
| Option D: | Life Cycle Cost Analysis |

| | |
|--------------------------------|---|
| Q2 (20 Marks) | Solve any Four out of Six 5 marks each |
| A | <i>Explain product data management in detail.</i> |
| B | <i>Explain virtual product development tools in detail.</i> |
| C | <i>Explain the concept of sustainable development.</i> |
| D | <i>Explain virtual manufacturing in detail.</i> |
| E | <i>Explain product data management along with its advantages.</i> |
| F | <i>Explain the framework of life cycle assessment.</i> |

| | |
|---------------------------------|---|
| Q3. (20 Marks) | Solve any Two Questions out of Three 10 marks each |
| A | <i>Explain life cycle phases in detail.</i> |

| | |
|----------|---|
| B | <i>Explain product life cycle strategies in brief.</i> |
| C | <i>Explain various product development tools in detail.</i> |

University of Mumbai
Examination 2020 under cluster ALL(Lead College: VCET)
Examinations Commencing from 7th January 2021 to 20th January 2021
Program: **ALL_Institute Level Optional Course 1**
Curriculum Scheme: Rev2016
Examination: BE Semester VII
Course Code: ILO 7019 and Course Name: Development Engineering

Time: 2 hour

Max. Marks: 80

0701_R16_ALL_VII_ILO7019_QP1

| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
|-----------|---|
| 1. | Which of the following was the first committee on Panchayati raj in India |
| Option A: | Balwant Rai Mehta |
| Option B: | Ashok Mehta |
| Option C: | L.M.Singhvi |
| Option D: | S. Mohinder Singh |
| 2. | When is National Panchayati Day celebrated |
| Option A: | 23rd December |
| Option B: | 1st June |
| Option C: | 24th April |
| Option D: | 15th September |
| 3. | 73rd amendment gave practical shape to which article of the constitution |
| Option A: | Article 14 |
| Option B: | Article 32 |
| Option C: | Article 40 |
| Option D: | Article 51 |
| 4. | The multi-dimensional poverty index is a measure developed by the |
| Option A: | UNCTAD |
| Option B: | World Bank |
| Option C: | International Monetary Fund IMF |
| Option D: | Oxford poverty and human development initiative , OPHDI , and the UNDP |
| 5. | Which of the following system is established on the basis of direct election |
| Option A: | Gram Panchayat |
| Option B: | Block Committee |
| Option C: | Zila Parishad |
| Option D: | District |
| 6. | Engagement of local people in development project refers to |
| Option A: | Economic development |
| Option B: | Socila development |
| Option C: | Participatory development |
| Option D: | Sustainable development |

| | |
|-----------|---|
| | |
| 7. | Panchayats are constituted for |
| Option A: | four years |
| Option B: | five years |
| Option C: | six years |
| Option D: | three years |
| | |
| 8. | Bread labour means |
| Option A: | To earn one's livelihood by engaging in manual labour |
| Option B: | Hard physical labour |
| Option C: | Labour for making bread |
| Option D: | Engaging in agriculture |
| | |
| 9. | The Human Development Index ranks the countries based on their performance in the key areas of (1) health, (2) sex-ratio, (3) education (4) access to resources |
| Option A: | 1,2,3 |
| Option B: | 2,3,4 |
| Option C: | 1,3,4 |
| Option D: | 1,2,4 |
| | |
| 10. | Which one of the following is not a correct statement ? |
| Option A: | Growth is quantitative and value neutral |
| Option B: | Development means a qualitative change which is always value positive |
| Option C: | Positive growth and development refer to changes over a period of time |
| Option D: | Both growth and development refer to changes over a period of time. |
| | |
| 11. | Which of the following elements must always be in the mind of the engineer while performing his duties vis-à-vis Ethics (1) public safety, (2) economy, (3) health, (4) welfare |
| Option A: | 1,2,3 |
| Option B: | 1,2,3,4 |
| Option C: | 1,4 |
| Option D: | 1,3,4 |
| | |
| 12. | According to Gandhi, ' Enjoy the wealth by renouncing it' is the essence of |
| Option A: | Trusteeship |
| Option B: | Sarvodaya |
| Option C: | Swaraj |
| Option D: | Ramarajya |
| | |
| 13. | The term that refers to principles, values, beliefs that define right or wrong behaviour is |
| Option A: | Customer satisfaction |
| Option B: | Innovation |
| Option C: | Ethics |
| Option D: | Empowerment |
| | |
| 14. | In which five year plan the Panchayat Raj System was introduced in India for the first time |
| Option A: | First |

| | |
|-----------|---|
| Option B: | Second |
| Option C: | Fifth |
| Option D: | Sixth |
| | |
| 15. | Which of the following is an appropriate general principle with regard to engineering ethics |
| Option A: | The engineer shall regard his duty to the public welfare as paramount to all other obligations |
| Option B: | The engineer shall regard his duty to the objectives of the company as paramount to all other obligations |
| Option C: | The engineer shall regard his duty to the Profession of engineering as paramount to all other obligations |
| Option D: | The engineer shall regard his duty to his excellence as paramount to all other obligations |
| | |
| 16. | Those individuals who raise ethical concerns to others inside or outside the organisation are called |
| Option A: | Entrepreneur |
| Option B: | Whistle blower |
| Option C: | Social entrepreneur |
| Option D: | Social impact management |
| | |
| 17. | Which of the following is not a key intervention to improve governance |
| Option A: | Facilitating independent and inclusive journalism |
| Option B: | Capacity building of government officials |
| Option C: | Advocacy for policy design and implementation |
| Option D: | Employment for all |
| | |
| 18. | Which of the following is not in the 11 th schedule of subjects |
| Option A: | Fisheries industry |
| Option B: | Safe drinking water |
| Option C: | Markets and fairs |
| Option D: | Large irrigation projects |
| | |
| 19. | The following is not a stated objective of Self Help Groups |
| Option A: | Provide employment to the members |
| Option B: | Create awareness about rights |
| Option C: | Foster a sense of community |
| Option D: | Entrepreneurship development |
| | |
| 20. | Those individuals who raise ethical concerns to others inside or outside the organisation are called |
| Option A: | Entrepreneur |
| Option B: | Whistle blower |
| Option C: | Social entrepreneur |
| Option D: | Social impact management |

| Q2 | Solve any Four out of Six | 5 marks each |
|-----------|---|---------------------|
| A | Explain the provisions of the 74 th amendment | |
| B | What is the scope of information and communication technology in rural India | |
| C | Define ethics and ethical dilemma | |
| D | What are the important components of Green Revolution | |
| E | What are the various steps taken for inclusion of women and the members of the reserved category in decision making | |
| F | Why was there a need to set up rural co-operatives | |

| Q3 | Solve any Four out of Six | 5 marks each |
|-----------|--|---------------------|
| A | Briefly discuss the various rural development schemes in India | |
| B | What is the importance of ethical conduct in business | |
| C | Human Development Index is a barometer of a nation's progress- Comment on this while giving specific examples to prove your point | |
| D | What are self help groups (SHG)? Explain their significance in rural development | |
| E | Discuss any 2 initiatives of the Government of India towards urban development | |
| F | What are the functions of Panchayat Samiti | |

University of Mumbai
Examination 2020 under cluster ALL (Lead College: VCET)

Program: **ALL_Institute Level Optional Course 1**

Curriculum Scheme: Rev2016

Examination: BE Semester VII

Course Code: ILO 7017

Course Name: Disaster Management and Mitigation Measures

Time: 2 hour

Max. Marks: 80

| | |
|------------|--|
| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
| 1. | Which of the following is NOT occurred as a consequence of earthquake |
| Option A: | Tsunami |
| Option B: | Fire |
| Option C: | Damage to building |
| Option D: | Drought |
| 2. | Which of the following is NOT the natural cause of flood . |
| Option A: | River bank erosion |
| Option B: | Poor natural drainage |
| Option C: | Heavy rain |
| Option D: | Deforestation |
| 3. | Terrorism is a _____ type of disaster |
| Option A: | Man made |
| Option B: | Natural |
| Option C: | Both natural and man made |
| Option D: | Neither natural nor man made |
| 4. | World Health Organization (WHO) was established in |
| Option A: | 1950 |
| Option B: | 1948 |
| Option C: | 1947 |
| Option D: | 1960 |
| 5. | Who heads NDMA, the apex body for Disaster management |
| Option A: | Home Minister |
| Option B: | Finance Minister |
| Option C: | Prime Minister |
| Option D: | Home Secretary |
| 6. | Which of the following is a disaster mitigation strategy? |
| Option A: | Constructing cyclone shelters |

| | |
|-----------|--|
| Option B: | Giving loans from banks |
| Option C: | Providing cheap electricity |
| Option D: | Providing school uniforms to children |
| | |
| 7. | Which of the following organization is the apex authority of disaster management in India? |
| Option A: | NDA |
| Option B: | NDMA |
| Option C: | CDMA |
| Option D: | INDR |
| | |
| 8. | If the deficiency of a particular year's rainfall more than 50 % of normal it is termed as |
| Option A: | Onset of Drought |
| Option B: | Moderate Drought |
| Option C: | Severe Drought |
| Option D: | Simple Drought |
| | |
| 9. | Magnitude of earthquake indicates amount of _____. |
| Option A: | vibrations per second |
| Option B: | vibrations per minute |
| Option C: | Oscillations |
| Option D: | energy released |
| | |
| 10. | By which Act, N.I.D.M got the statutory organization status? |
| Option A: | National Disaster Policy Act 1999 |
| Option B: | NDMP 2019 |
| Option C: | Disaster Management Act 2005. |
| Option D: | National DM Policy 2009 |
| | |
| 11. | Amateur Radio is also known as? |
| Option A: | Ham radio |
| Option B: | Home radio |
| Option C: | Pocket radio |
| Option D: | Silent radio |
| | |
| 12. | What are the three phases of disaster management planning? |
| Option A: | Preparation, Response and Recovery |
| Option B: | Preparation, Planning and Perception |
| Option C: | Evacuating, Rebuilding and Re-branding |
| Option D: | Planning, Evacuating and Recovery |
| | |
| 13. | Cyclones, Heat wave , Climate change are part of _____ disaster. |
| Option A: | The Geological Disaster |
| Option B: | The Hydrological Disasters |
| Option C: | The Meteorological Disasters |
| Option D: | The Chemical Disaster |
| | |

| | |
|-----------|--|
| 14. | The Indian Tsunami Early Warning Centre (ITEWC) established at Indian National Centre for Ocean Information Sciences is located in |
| Option A: | Chennai |
| Option B: | Kochi |
| Option C: | Goa |
| Option D: | Hyderabad |
| 15. | In _____ in 2013 cloudburst created the flash flood situation to cause heavy damage to lives and property. |
| Option A: | Uttarakhand |
| Option B: | Chennai |
| Option C: | Kashmir |
| Option D: | Karnataka |
| 16. | When was the updated & revised National Disaster Management Plan was prepared? |
| Option A: | 2016 |
| Option B: | 2019 |
| Option C: | 2018 |
| Option D: | 2017 |
| 17. | Which of the following is the best thing to do during heavy lightning? |
| Option A: | lie on the ground in an open place |
| Option B: | Go into a water body |
| Option C: | Stay indoors, away from metallic doors and windows |
| Option D: | Stand under a tall tree |
| 18. | The given three actions are arranged for which step i) The planning ii) The training and iii) The supply |
| Option A: | The prevention step |
| Option B: | Recovery step |
| Option C: | The preparation step |
| Option D: | The recovery step |
| 19. | The Vision of _____ is “To build a safer and disaster resilient India by a holistic proactive technology driven and sustainable development strategy that involves all stake holders and fasters a culture of Prevention, preparedness and Mitigation. |
| Option A: | N.D.R.F |
| Option B: | N.D.M.A |
| Option C: | S.D.R.F |
| Option D: | N.I.D.M |
| 20. | S.D.R.F Stands for |
| Option A: | State Disaster Response Fund |
| Option B: | State Disaster Relief Fund |
| Option C: | State Dedicated Relief Fund |
| Option D: | State Dynamic Response Fund |

| | | |
|-----------|--|---------------------|
| Q2 | Solve any Four out of Six | 5 marks each |
| A | State and describe the measures to prevent the global warming. | |
| B | Define “Nuclear Disaster “and describe the effects of Nuclear disasters in India | |
| C | What are the long term and short-term effects of disaster? | |
| D | What are the main phases of Disaster Management? | |
| E | Describe the importance and the methods to create public awareness in Disaster management? | |
| F | Explain the role of Government Agencies in Relief fund raising for Disaster management. | |

| | | |
|------------|---|----------------------|
| Q3. | Solve any Two Questions out of Three | 10 marks each |
| A | Write detail note on occurrence, causes and measurement of earthquake. List out some of the major earthquakes occurred in India | |
| B | Explain the role of NGO’s in post disaster scenario and during rehabilitation. | |
| C | State Do’s and Don’ts in case of various disasters. | |

University of Mumbai
Examination 2020 under cluster ALL(Lead College: VCET)

Examinations Commencing from 7th January 2021 to 20th January 2021

Program: ALL_Institute Level Optional Course 1

Curriculum Scheme: Rev2016

Examination: BE Semester VII

Course Code: ILO 7012 and Course Name: Reliability Engineering

Time: 2 hour

Max. Marks: 80

| | |
|-----------|---|
| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
| 1. | The Bathtub curve indicates failure probability, Which stage is NOT normally associated with the bathtub curve? _____ |
| Option A: | Pulling the plug where production is halted due to unacceptable level of failures |
| Option B: | Infant-mortality where failures occur early |
| Option C: | Wear-out where failure increases due to age |
| Option D: | Normal-life where few failures occur |
| 2. | Three components each with a reliability of 0.9 are placed in series. What is the reliability of the system ? |
| Option A: | 0.729 |
| Option B: | 0.125 |
| Option C: | 0.00258 |
| Option D: | 0.989 |
| 3. | . If A is a perfect subset of B and $P(a) < P(b)$, then $P(B - A)$ is equal to _____ |
| Option A: | $P(a) / P(b)$ |
| Option B: | $P(a) P(b)$ |
| Option C: | $P(a) + P(b)$ |
| Option D: | $P(b) - P(a)$ |
| 4. | In order to maintain maintainability in the system, repair time must _____ |
| Option A: | be increased |
| Option B: | be reduced |
| Option C: | kept constant |
| Option D: | keeps on changing |
| 5. | What refers to wear out failure _____. |
| Option A: | Depends upon the subject |
| Option B: | Depends upon type of the experiment |
| Option C: | Increasing failure rate |
| Option D: | Decreasing failure rate |
| 6. | Find median and mode of the messages received on 9 consecutive days 15,11,9, 5,18,4,15,13,17. |
| Option A: | 13,6 |
| Option B: | 13,18 |

| | |
|-----------|---|
| Option C: | 18,15 |
| Option D: | 15, 16 |
| | |
| 7. | The reliability of a device comprised of various parts functioning in series is the : |
| Option A: | Product of the reliabilities |
| Option B: | Sum of the probabilities of the unreliabilities |
| Option C: | Product of the unreliabilities |
| Option D: | Sum of the reliabilities |
| | |
| 8. | Which among the following exhibits inversely proportional relationship with the reliability? |
| Option A: | Production cost |
| Option B: | Maintenance and repair cost |
| Option C: | Design and development cost |
| Option D: | Availability |
| | |
| 9. | If 'm' is the mean of a Poisson Distribution, then variance is given by _____ |
| Option A: | m^2 |
| Option B: | $m^{1/2}$ |
| Option C: | m |
| Option D: | $\frac{m}{2}$ |
| | |
| 10. | Which of the following is not considered a reliability design method _____. |
| Option A: | Parts selection |
| Option B: | Choice of technology |
| Option C: | Accessibility |
| Option D: | Derating |
| | |
| 11. | Markov analysis is a technique that deals with the probabilities of future occurrences by _____. |
| Option A: | Using Bayes' theorem |
| Option B: | Analyzing presently known probabilities |
| Option C: | Time series forecasting |
| Option D: | The maximal flow technique |
| | |
| 12. | Skewness of Normal distribution is _____ |
| Option A: | Negative |
| Option B: | Positive |
| Option C: | 0 |
| Option D: | Undefined |
| | |
| 13. | The design function which assigns probability of failures between components or subsystems is called: |
| Option A: | Significance |
| Option B: | Prediction |
| Option C: | Qualification |
| Option D: | Apportionment |
| | |
| 14. | What is MTTR |

| | |
|-----------|---|
| Option A: | Mean Time To Restore |
| Option B: | Mean Time To Repair |
| Option C: | Mean Time To Recovery |
| Option D: | Mean Time to Restoration |
| 15. | The inherent availability can be calculated for repairable system as: |
| Option A: | $A_I = \frac{MTBF}{MTTF + MTTR}$ |
| Option B: | $A_I = \frac{MTTF}{MTTF + MTTR}$ |
| Option C: | $A_I = \frac{MTTF}{MTBF + MTTR}$ |
| Option D: | $A_I = \frac{MTTR}{MTTF + MTTR}$ |
| 16. | Three companies A, B and C supply 25%, 35% and 40% of the notebooks to a school. Past experience shows that 5%, 4% and 2% of the notebooks produced by these companies are defective. If a notebook was found to be defective, what is the probability that the notebook was supplied by A? |
| Option A: | 44/69 |
| Option B: | 25/69 |
| Option C: | 13/24 |
| Option D: | 11/24 |
| 17. | What would happen, if an equipment possesses reliability and maintainability to the maximum extent in accordance to MTTR? |
| Option A: | Failure rate is higher & downtime is longer |
| Option B: | Failure rate is lower & downtime is longer |
| Option C: | Failure rate is higher & downtime is shorter |
| Option D: | Failure rate is lower & downtime is shorter |
| 18. | All fault-tolerant techniques rely on |
| Option A: | Integrity |
| Option B: | Dependability |
| Option C: | Redundancy |
| Option D: | Reliability |
| 19. | What is the Major Key parameter of maintainability? |
| Option A: | Accessibility |
| Option B: | Vulnerability |
| Option C: | RCS |
| Option D: | Survival |
| 20. | Which of the following is the biggest impact of availability |
| Option A: | mean time |
| Option B: | median time |
| Option C: | downtime |
| Option D: | maximum time of repair |

| Q2 | Solve any Four out of Six | 5 marks each |
|-----------|--|---------------------|
| A | Tests performed on a self-diagnostic module for a complex electronic system resulted in correct diagnostics of a known fault 98% of time with only a 1% false reading when it was known there were no faults present. The Probability of a failure (fault) occurring over the test period is 0.005. How reliable is the self-diagnostic module? | |
| B | <p>Consider the system below. Do the following</p> <p>a) Assume that all components are identical and independent, and have a reliability $R(t)$. Find the expression for the system reliability.</p> <p>b) Assume the components have exponentially distributed failure times with parameter λ. Develop an expression for the failure rate of the system $\lambda_s(t)$.</p> | |
| | <pre> graph LR In(()) --- C1[1] C1 --- J1(()) J1 --- C5[5] J1 --- J2(()) J2 --- C2[2] J2 --- C4[4] C2 --- C3[3] C4 --- C3 C3 --- Out(()) </pre> | |
| C | Explain measures of Availability. | |
| D | Obtain reliability of Parallel system containing of n components, when the reliability of each component is known. Assume that the units are non-repairable. | |
| E | Explain the Failure Mode Effects analysis | |
| F | Explain Reliability Block Diagram with example | |

| Q3 | Solve any Two out of Three | 10 marks each |
|-----------|---|----------------------|
| A | Explain Bath Tub Curve, Hazard rate, failure density and Failure Rate with help of suitable example | |
| B | It is known that 5% of the book bound at a certain bindery have defective bindings. Find the probability that 2 of 100 books bound by this bindery will defective binding using the Poisson approximation to the binomial distribution. | |
| C | Explain Reliability Improvement methods with suitable example | |