Code No. 3492

FACULTY OF ENGINEERING

B.E. II – Semester (Main) Examination, May/June 2017

Subject: Engineering Mathematics – II

Time: 3 Hours **Max.Marks: 70**

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

PART – A (20 Marks)

1 Solve $(x^3 - 2y^2)\,dx + 2xy\,dy = 0$.

2 Solve $\cos^2 x.\frac{dy}{dx} + y = \tan x$.

3 Solve $(D^3+16D)y = 0$.

4 Find the particular integral of $(D^2-4D+4)y = e^{2x}$.

5 Determine the nature of the singular points of the differential equation

$x^2y'' + 9xy' + 6y = 0$.

6 Express $f(x) = 5x^3+6x^2+4$ in terms of Legendre polynomials.

7 Evaluate $\int_0^\infty t^4.e^{-2t^2}\,.dt$.

8 Evaluate $\int_0^\infty e^{-mx}\left(1-e^{-x}\right)^n .dx$, where m, n are positive integers.

9 Find $L\{t^3 e^{-4t}\}$.

10 Find $L^{-1}\left\{\frac{1}{(s+2)(s+3)}\right\}$

PART – B (50 Marks)

11 a) Solve $x\frac{dy}{dx} + y = y^2 x^3 \cos x$.

b) Find the orthogonal trajectories of the family of circles $x^2+y^2=2gx$ where g is the parameter.

12 a) Solve $(D^2+4)y = x^2+1+\cos 2x$.

b) Solve $(x^2 D^2 + x D + 1)y = \log x$.

13 Find the Frobenius series solution about x = 0 of the equation $x\,y'' + (1-x)\,y' + 3y = 0$.

14 a) Show that $\int_0^t \operatorname{erf}(\alpha x)\,dx = t\,\operatorname{erf}(\sim t) + \frac{1}{2\sqrt{\pi}}\left[e^{-\alpha^2 t^2} - 1\right]$.

b) Show that $x\,J_n'(x) = n\,J_n(x) - n\,J_{n+1}(x)$.

15 a) Evaluate $L\left\{e^{-t}\int_0^t \frac{\sin u}{u}\,du\right\}$.

b) Evaluate $L^{-1}\left\{\log\left(\frac{s+3}{s+4}\right)\right\}$.

16 a) Find the general solution of the equation
$y' = 4xy^2 + (1-8x)\,y + 4x - 1$, if $y = 1$ is a particular solution.

b) Solve $(D^2+9)y = 4\tan 3x$ by the method of variation of parameters.

17 a) Show that $P_n'(x) = x\,P_{n-1}'(x) + n\,P_{n-1}(x)$.

b) Solve $\frac{d^2y}{dt^2} - 2\frac{dy}{dt} + y = e^t$ where $y(0)=2$, $y'(0) = -1$ by the method of Laplace transforms.

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